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ABSTRACT

The stated purpose of this report is to locate the scattered pieces of information concerning adolescence and compensatory education in order to assess whether these pieces form any coherent pattern, and determine the possible implications of any such pattern for federal policy in education. Four principal sources of information were available for this study: the literature on educational and psychological research, annual state level reports of Elementary Secondary Education Act Title 1 programs, scores from the annual California state testing program, and observations of operating projects. The findings of this report include the following: The present Federal strategy, it is held, is built on the expectation that treatment in preschool and primary grades makes unnecessary special attention in later years. However, this is not the case. For a variety of reasons, many youngsters either do not attend or do not benefit from early programs. Even those who do well in early programs frequently regress to previous levels by the time they enter junior high school. Moreover adolescents--and in particular the disadvantaged--have special learning needs that cannot be met by early interventions. A new strategy, it is argued, is clearly required which will give greater attention to providing age-appropriate education throughout the school career of the disadvantaged students. (Author/JM)

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PREFACE

The reports of the Educational Policy Research Center at SRI are produced at the request of the Office of the Assistant Secretary for Education, and are designed principally for use by that staff. However, since the topic of a national strategy for compensatory education is one of considerable public interest, we have tried to present our findings in a way that will also be of maximum usefulness to a broad range of readers.

We are much indebted to the research staff of the Center, and to the editorial staff of SRI for providing professional talents without which we could not have produced this volume. Robert Cory, Anne Fitzmaurice and Pia Moriarty gave us invaluable help with the literature review; Mae Stephen, Karen Myers, and Shirley Hentzell greatly improved the final product by their intelligent contributions and thoughtful editing of the manuscript. Our tasks of research and writing were improved and speeded by their help.

EXECUTIVE SUMMARY

Disadvantaged students in the intermediate and secondary grades have been neglected by our national policy of compensatory education. Only a small (and declining) fraction of federal money for compensatory education is spent on providing children beyond the age of ten with compensatory help in basic academic and cognitive skills.

The present federal strategy is built on the expectation that treatment in preschool and primary grades obviates the need for special attention in later years. This is not the case. For a variety of reasons, many youngsters either do not attend or do not benefit from early programs. Even those who do well in early programs frequently regress to previous levels by the time they enter junior high school. Analyses of state level data on compensatory programs in the primary grades indicate that even the most effective do not provide accumulating gains. Moreover, adolescents have special learning needs that cannot be met by early interventions. The necessity of providing specifically for the needs of disadvantaged students beyond the primary years cannot be brushed aside. Meeting these needs and achieving our national goals for compensatory education will require the development of programs which are both more sustained and more age comprehensive than the present strategy provides. A new strategy is clearly required which will give greater attention to providing age-appropriate education throughout the school career of the disadvantaged students.

Special compensatory programs solely for grades 1-3 would make sense if third-grade skills were the goal of schooling. However, that is not the case. Instead, children appear to need new skills at each grade level; compensatory programs in second grade will not teach all of the skills needed in sixth grade, for example.

One of the reasons for our present lopsided strategy has been our fixation on early childhood and the adoption of analytical models drawn

largely from the biological sciences that denigrate the importance of adolescent years. These models have not proven to be sound bases for the development of effective educational policy. The problem is not that early childhood programs have failed, but that by themselves they can perform only a portion of the task.

Fortunately, a growing body of psychological and educational research offers alternatives and details cognitive and psychological characteristics of adolescents that point to special potentials for learning. During adolescence the student gains the ability to take an objective viewpoint, which is crucial to the understanding and mastery of effective written communication. He also makes important decisions about his relationship to school and to society that affect his motivation. Perhaps most important is the development of what is called "formal operational thinking," which enables adolescents to adopt whole conceptual systems rather than having to acquire bits of knowledge piecemeal. These and other abilities specific to adolescence make the intermediate and secondary grades periods of enormous learning potential, and a logical choice for compensatory intervention.

A study of state reports from ESEA Title I programs during the years 1970-73 uncovered no basis for the claim that compensatory projects for adolescents are less effective than those for children in primary grades. Grade equivalent gains in reading skills are consistently higher for students in grades 7-12, with both mean and median gains of over one month per month. Furthermore, by distinguishing between gains that can be attributed to program effects and the normal expected gains during a school year, the study suggests that compensatory projects in grades 7-12 are at least equally effective as, and perhaps more effective than, those in grades 1-6 at moving disadvantaged students toward national reading test norms.

Such encouraging reports are in keeping with the high potential for learning of the adolescent years, but are nevertheless surprising given the extremely difficult circumstances under which most of these projects must operate. Implementation of projects in grades 7-12 is hampered by special administrative difficulties, as well as by lack of

suitable instructional materials and often by the apathy and/or hostility of staff (at school, district, state, and even federal levels). Despite these hurdles, compensatory projects for adolescents have an impressive record. There are now a number of well tested, enduring, reproducible, and highly cost-effective projects that might be used as a starting point for a comprehensive compensatory strategy.

Recommendations are made in three areas.

First, we recommend that the present strategy of compensatory education be replaced with one that provides for equal and age-appropriate efforts throughout the grade levels. At the intermediate and secondary levels, compensatory projects should combine attention to basic cognitive skills with attention to other academic, personal, and vocational skills.

Second, we recommend that the Education Division provide for research and development efforts in NIE and OE to:

- Locate and analyze successful projects at the intermediate and secondary levels.
- Clarify long-term and mid-range goals for compensatory programs, and develop measurement tools appropriate to the goals.
- Develop measures of cost-effectiveness appropriate for use at the different grade levels.
- Use retrospective analysis to locate any important differences in the long-term effects of various intervention strategies.

Third, we recommend that the Education Division take immediate steps to ease the transition into a more balanced compensatory strategy by:

- Eliminating both implicit and explicit bias--in regulations, guidelines, and administrative practices--against compensatory education for adolescents.

- Giving special priority to the dissemination of information about successful intermediate and secondary projects.
- Designing a program of project demonstration grants for compensatory education beyond the sixth grade.
- Making use of existing DHEW and OE programs for providing in-service teacher training, materials development, and other relevant services for compensatory education programs for the upper grades.

I THE ENDS AND THE MEANS OF COMPENSATORY EDUCATION

Americans traditionally defend the value of education by the contribution which it makes to the richness and productivity of the lives people lead after they leave school. As a nation, our best hopes for compensatory education are in keeping with these values. That is, we hope to see the success of compensatory education in the skills and attitudes that disadvantaged students take with them as they enter the adult society. We hope that special efforts will result in greater satisfaction, better jobs, and a higher quality of life that comes from having a complete and appropriate set of tools for living in the society.

Since their inception, our national programs of compensatory education have had a wide range of goals, spanning finance, organization, and education. However, the principal goals for students reflect a concern for outcomes. For example, we are interested in:

- Ensuring that all disadvantaged students have acquired some minimum level of skills, knowledge, and attitudes by the time they leave the public education system, particularly "basic skills" in reading and mathematics.
- Achieving some distribution of achievement outcomes for low income students that is approximately the same as for higher income students.
- Reducing the total range of skills and knowledge variation among students by raising the average achievement level of currently low-achieving students.

In this oversimplified form, these goals can be stated as minimal competencies and expectations. For example, we may feel that <u>every</u> student should be able to read and calculate at the 5th grade (or 8th grade, or 12th grade) level upon leaving high school. Or again, that half the students from low income families should, upon graduation, be able to

read at or above the national norm. This study will look at the role that compensatory education can play during adolescence and pre-adolescence in aiding students and schools to achieve these kinds of goals.

Early in the history of federal compensatory programs it was plausibly argued that special programs might well start with the early grades as they were "phased-in." However, eight years later we find that most programs end with younger children, and rarely extend beyond the first few years of schooling. Money has been so targeted on the early years that half of the nation's disadvantaged students, those in grades 7 through 12, now get only a fraction of the money allocated to the younger group. As a result many innovative but not particularly successful preschool and primary programs have become household words, while innovative and very successful programs at the secondary level are not even known to those officials charged with designing effective strategies.

The inadvisability of our present strategy is particularly clear when considered in the light of specific program goals. Special programs only in grades 1-3 would make sense if we were content with providing disadvantaged students with 3rd grade reading and arithmetic skills. If our goal is indeed to provide students with 8th grade skills, then we must provide assistance with teaching and learning these skills at least up to and through the 8th grade. The same applies for 9th, 10th, or 12th grade skills. If we then add such goals as providing social skills and attitudes, or knowledge about history, geometry or biology, or abilities central to finding and keeping productive jobs--if in short we ask more for low income students than functional (il)literacy--then the necessity for compensatory programs in the upper grades is so much the greater.

The present folklore holds that deficits at an early age foredoom the child to continued failure, and that substantial learning at later stages is impossible. As we will discuss in later sections, there seem to be equally good reasons to believe that deficits can and perhaps

must be overcome later. Skills and content matter that can be learned at age 6 can also be learned at age 15. As William Rohwer and others have pointed out, if your goal is to achieve stated proficiencies upon high school graduation, then the last years of work before graduation are the ones that are critical. Rohwer argues (1971)* that the early school years are important only as they contribute knowledge and skills essential to performing the tasks of the later school years, or teach skills that could not be learned later. Nevertheless, our national strategy continues to be one of providing assistance only during the earliest years, assuming that attention to older students will then be unnecessary.

For a number of reasons, this is not the case. In the first place, despite federal expenditures of well over $1.6 billion per year--over $1.8 billion is proposed for FY 1975--not all disadvantaged children participate in compensatory programs in the early years. Funding would need to be dramatically increased to reach all eligible young children. Underfunding means that not every school has a Title I project each year. Thus many older disadvantaged students may have received no compensatory education during the early grades, while others may have received a mixture of neglect and sporadic, intensive interventions.

Second, many of the primary grade compensatory projects in which disadvantaged children have participated have not been very effective. Although some compensatory programs for young children provide effective social and intellectual services, many others do not. Over the several years of Title I operations, analyses of state and federal level achievement data have been consistently pessimistic about the ability of many special programs to obtain and maintain satisfactory gains (AIR report, 1971). During FY 1972 a small number of states were able to report mean program gains of one month per month in the program across all

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*References are listed in alphabetical order at the end of this report.

grades. Even in these few states, however, many programs fell well below this gain, and it is not uncommon to find projects in the lower grades where pupils appear to have regressed in their skills. Thus, mere exposure to such programs is not a guarantee of benefit, and many older children who have participated in unsuccessful programs will still need compensatory assistance. Recent analyses suggest that state programs are improving in effectiveness over the pretest, posttest period, but that substantial problems remain.

Similarly, older children may still have serious basic skills deficiencies despite earlier exposure to special programs if, at the time of that exposure, they were not cognitively ready to gain the maximum benefit from it. Studies by Kagan, Piaget, Elkind and Moore suggest that the rate at which certain cognitive capacities develop is influenced by individual and cultural factors. Thus the children of low income, minority families who form the target group of compensatory education programs, may develop the particular set of skills needed for school learning more slowly than do upper income children. Therefore, not all such children will be able to gain full benefit from even well-designed and generally effective early programs.

Finally, even students who demonstrate substantial positive response to early grade programs, face a sadly high chance that these gains will have dissipated by the time they enter secondary school. Evidence is accumulating that even in states reporting mean program gains of month per month over several years, such gains are not cumulative over time for individual students. This means that the "disadvantaged" population remains the same distance behind the national and state norms from year to year. For example, a study of Title I programs in California (Thomas and Frentz, 1974) indicates that despite apparently successful programs in the early grades, test scores for the disadvantaged group when measured at the 6th grade are not rising for successive age cohorts. Possible explanations for this phenomenon include over-the-summer losses (Heyns, 1974), and pupil mobility. Whatever the reasons, however, the result is that older children are still far behind.

As much or more to the point, however, is that adolescents have specific educational needs that cannot be served by earlier programs because the needs do not exist earlier. Certain subjects that cannot be taught in the early grades must now be learned, and older disadvantaged children will again need additional help if they are to catch up and keep up with their middle class counterparts. Even basic skills such as reading must now be used in new ways--skimming, summarizing and abstracting passages--vocabulary must be expanded and writing skills developed. The intellectually less rich environment of the disadvantaged adolescent is now an even greater handicap than it was during the primary years. The high school dropout rate across the nation continues to be about 25% each year, and it is much higher among minority youth. The dropout rate attests to the fact that for whatever reasons, school continues to be a less successful and less profitable venture for the older disadvantaged student.

The circumstances cited here must make us reexamine the cliché that it is better to prevent problems by treating young children than to have to cure them later on. As a moral premise, this statement cannot be attacked; children obviously should not have to prove their need for help by failing first. As a policy statement, however, it makes less sense. There are, in fact, hundreds of thousands of older students with serious academic problems, for any or all of the reasons discussed above. Targeting money on new cohorts of very young children can do nothing to solve the very real problems of the older students; nor, it seems, can it prevent many of the real problems which those young children will themselves face later on. The unpleasant suspicion grows that we actually feel that older students have had their chance; if for some reason they have not solved "their" problems, it is no longer our concern. However, the poorly educated are of concern to society. Between birth and graduation from high school at age 18 or so, a child goes through a number of distinct stages of growth and development. Achievement in compensatory programs in the stages of development from 3-8 years is important, but it does not ensure that the child of a low income family will successfully negotiate the difficulties--or take advantage of the opportunities--experienced in later grades.

A new strategy is needed if our national efforts in compensatory education are to begin to meet our aspirations and the needs of the disadvantaged students; many of our past efforts and present arrangements must be reexamined. In the following sections we attempt to lay some ground work for the work that must be done.

We would like to remind the reader that this report is not intended to be a complete evaluation of Title I programs nor is it a report on any tightly structured and controlled experiment designed to test specific hypotheses. Instead, its function is to locate the scattered pieces of information concerning adolescence and compensatory education to assess whether these pieces form any coherent pattern, and to determine the possible implications of any such pattern for federal policy in education. It is a policy document, drawing upon both the research and evaluation of others, and thus is more akin to a type of intelligence report than to original research.

The methods of conducting this kind of study are naturally very different from those used in either a basic research study or federal program evaluation. Similarly, this report makes no attempt to follow the traditional format or style of a research journal report. Our central concern is to describe the available information in a way that is as straightforward as possible and to relate our assessment directly to issues of immediate policy concern.

In order to assess the importance of compensatory education during early adolescence, it was necessary to examine two separate bodies of data, and the study was divided accordingly. The first part of the study (Sections II and III) reviewed the literature on educational and psychological research with these central questions in mind:

(1) What is known or supposed about the cognitive development, intelligence, and learning in the years of early adolescence (approximate ages 11-15)?

(2) How are these characteristics related to the tasks of school learning and to the acquisition and retention of applied intellectual skills?

(3) How are cognitive development and school learning related to other personal, social, and emotional characteristics during early adolescence?

(4) Are there differences in the rate or manner of cognitive development between advantaged and disadvantaged children which are pertinent during early adolescence?

(5) Finally, what research supports the prevailing early childhood intervention model? How well has this model worked? Do alternative models exist?

A second set of tasks required the examination of existing compensatory programs for older children. Although the majority of effort and money has been expended on primary grade programs, there are many examples of intermediate and secondary projects across the country, and an examination of their effectiveness is essential to a policy study. A number of important questions are raised.

(a) To what extent have compensatory projects in grades 7-9 been effective at raising the achievement levels of participating students?

(b) Who are the participants in these projects? How do they differ, if at all, from same-age children who do not participate and/or from the participants in primary grade projects?

(c) What is the cost of intermediate and secondary level projects or, alternatively, how much money is spent on them?

(d) If there are highly effective projects in these grades do they share certain characteristics of design, participation or implementation?

(e) Can we identify features in the context of such projects, (that is, in the schools or the society) that affect project effectiveness?

Three principal sources of information were available for this portion of the study: annual state level reports of ESEA Title I programs, scores from the annual California state testing program, and observations of operating projects. These data were far from perfect, and in many instances it was not possible to do the analyses of first choice. However, it has been possible to piece together a very compelling outline of the context and performance of upper level compensatory programs. Section IV describes our assessment of the performance of state level Title I programs in grades 7-9, while Sections V and VI discuss school and societal contexts respectively. Conclusions and recommendations for policy are presented in Section VII.

II THE ORGANISMIC PARADIGM AND EARLY CHILDHOOD EDUCATION

A basic paradigm influences the way events and data are interpreted, and largely determines which questions will be addressed and what methods will be selected to find answers to them. Such a paradigm is not itself a target for verification or denial; instead, it provides a framework of reference that gives meaning to individual data, circumstances, or events. The strength of a basic paradigm is that it organizes and gives coherence to research. The weakness of it is that it makes researchers insensitive to divergent data or to interpretations that are inconsistent with the paradigm.

The organismic paradigm has been central to much of the research used to support existing compensatory education programs. This paradigm has also been used to justify the concentration of these programs on early childhood education. The purpose of this section is not only to examine the organismic paradigm, but also to examine theories and experiments which, because they do not fit the model, have tended to be ignored or, at the least, have received far less thoughtful consideration.

The basic premises of present compensatory education programs are these:

- The disadvantaged child is caught up in a cycle of poverty which in some measure results from low IQ and low school achievement. These in turn result in some measure from the effects of an environment of deprivation.
- The application of appropriate stimulation and enrichment to young disadvantaged children can aid in their development.

- The good effects of this stimulation and the resulting improved development will be felt throughout the child's subsequent intellectual, social and emotional life.
- Without such stimulation in the early childhood years, a disadvantaged child cannot break out of a pattern of low achievement, limited intellectual competence, and negative self-image.
- Thus, early childhood is the right time and, given limited funds almost the only time, for society to intervene in development.

In large part, these premises are derived by analogy from a model of organismic development that goes beyond a relatively straightforward sense of historical process. Basic to the organismic model is the concept of critical stages--periods at which the organism is especially vulnerable and where the occurrence or omission of some event determines later development.

The organismic paradigm can be examined usefully as a set of component concepts:

(1) Human development--physical, emotional, psychological, and cognitive--occurs in stages that are inextricably related to specific ages (in months or years) of the child.

(2) "Success" in a later stage is determined by the experience of the organism (child) in earlier stages. Therefore, the earliest stage is the most important for determining final outcome.

(3) Insult or deprivation during an early stage may arrest or warp development in that stage in a way that precludes the normal attainment of higher stages. Such damage is irreversible.

From these three component concepts, a fourth can be derived that supports the present system of compensatory education:

(4) If insult or deprivation can have significant and lasting negative effects, then enrichment (or at least compensating for the deprivation) should have significant and lasting positive effects if administered during the critical periods.

This last concept assumes, among other things, that the nature of the deprivations important to the cognitive development of the child can be identified adequately; that adequate remedies (enrichment or stimulation) can be devised; and that these remedies (compensatory education) can be applied effectively by educational institutions on the basis of a generalized model.

As we review the research literature that supports this model, we propose to examine it in the light of a number of questions. For example, if development does indeed occur in stages, then do the same stages apply equally to physical, emotional, social, and cognitive development? Does failure to reach a particular stage of development in one area (say emotional development) preclude progress toward higher stages of development in other areas? And finally, are development stages inextricably linked to chronological age?

Another set of questions concerns deprivation. For example, are the ill effects of deprivation indeed irreversible, and if they are, are they equally so in each of the areas of development? If they are not irreversible, then is specific action required to reverse them, or do they tend to dissipate naturally over time? And finally, even if the ill effects of deprivation are shown to damage cognitive development irreversibly, is the degree of deprivation addressed by the research studies logically or demonstrably related to the actual deprivation experienced by the children whom compensatory education programs are designed to treat?

A final set of questions concerns enrichment. If some of the ill effects of deprivation can be reversed, might the good effects of enrichment also be reversible? And, if they do not dissipate naturally over time, might some specific combinations of events reverse them?

Stages of Development

The concept of stages of development has been derived in part from the work of Sigmund Freud and from Anna Freud's work with children. Freud was the first to generate intellectual acceptance of the idea that the child's psychic development had strong internal components and was not wholly shaped by external training ("molding the child's character"). Psychosexual development occurred in stages (the familiar oral, anal, oedipal, and genital), and the basis of the stages was instinctual. Furthermore, the most important development of stages occurred in the first few years, and trauma during this period could result in fixation at one stage rather than progression to another, which in turn would produce pathology that would be more or less crippling. These theories and the work that produced them led to studies of childrearing practices with emphasis on the importance of avoiding or remedying pathology, and eventually to the hypotheses of cultural styles of fixation. The work of both Freuds had a profound influence on most later research into early childhood, and the orientation of most thinking about the subject.

However, psychosexual development, although important, is not the same as cognitive development; although the two may be interactive, they are not inseparable. Severe psychosexual pathology can inhibit cognitive development, but in the absence of severe pathology, it appears that the two processes can proceed relatively independently.

Erickson, a disciple of Freud, adopted the theory of fixation at a stage, but extended the stages of personality development through adolescence, rather than compressing them all into the first years after birth. Erickson (1950) also hypothesized that development followed inner laws of rate and sequence, but was flexible with respect to chronological age.

More recent psychological theories of development (Gestalt psychology, Transactional Analysis, and others) stress the importance of the environment over "instinct." They also tend to stress the reversibility of psychological orientations of individuals at later ages, especially after the person develops the capacity to review himself, and to reason (i.e., after puberty).

Piaget (Inhelder and Piaget, 1958) was the first to hypothesize stages in cognitive development. According to Piaget, the child develops through three major stages (some with substages) that follow in sequence. These stages are thought to be only loosely related to the chronological age of the child, and the time of their occurrence may vary widely in different children. Piaget also extends the important stages through early adolescence. For example, the development of the third stage of "formal operations" is assigned to the period from 11 to 14 years.

According to the theories of Piaget, the timing of the child's progression through the various stages is determined by an interral mechanism, but can be influenced to some degree by external events. That is, some kinds of experience may speed up the child's "preset" attainment of the next stage, and the absence of certain common kinds of experience may retard it. In general, however, all stages will be attained eventually, and even under adverse circumstance, the child will not be fixated at an early stage.

The theory of developmental stages also has strong roots in the life sciences. For example, in the physical development of the child, it is immediately obvious that the baby is qualitatively different from (not just smaller than) the child, and the adolescent is qualitatively different from (not just larger than) the prepubertal child. Embryology also provides evidence of stages, and of critical periods; the same insult to the embryo may cause deformity if it occurs at one point in the development process and may have no identifiable effect at all if it occurs at another point (White et al., 1973). However, postpartum physical development does not appear to be subject to the same processes or vulnerabilities as embryonic development.

Development in stages appears to be a concept that can be confirmed intuitively, as well as by research, in many areas of human growth. There is strong suggestive evidence that emotions, social relationships, sexuality, and cognitive ability have some general stages in which behavior or competence differs both qualitatively and quantitatively from that in other stages.

However, it does not seem to have been established that development stages are inextricably linked to chronological age except for physical development before birth. Furthermore, there is at least suggestive evidence that, in the cognitive realm, development stages are only weakly linked with chronological age and are much more strongly linked with the internal development rate of the child and with life experience. Nor has it been established that fixation can occur at an early cognitive stage that irreversibly precludes attainment of later stages. (Learning to speak may indeed have to occur at a critical period, but inability to speak is not associated with disadvantage.) There may be other factors--brain damage, severe emotional pathology, or psychosis, for example--that prevent normal development of cognitive abilities, but otherwise it appears that although progress may be slowed or be laid aside temporarily under adverse circumstances, basic cognitive levels will eventually be attained by almost all children.

Deprivation and Effects on Development

Infantile marasmus ("wasting disease") not related to lack of food first became an identifiable medical problem as the result of the establishment of welfare reforms in Victorian England. Workhouses were established and, on the latest medical principles, the foundling infants were looked after in an isolated ward of their own instead of being given to the general female population of the workhouse to be cared for. In spite of being adequately fed, many such infants wasted away and died, while infants in less hygenic and less well-run workhouses, where the old practices were observed, survived and some even flourished.

In the 1940s, Spitz, perhaps the most influential researcher in the field in terms of his effect on compensatory education theory, studied the effects of institutionalization on infants from 4 months old. He found severe and lasting social and emotional problems, and he found that children seemed to develop more slowly. These findings he related to the lack of stimulation and socialization in the understaffed institutional environment (Spitz, 1945).

The extension of Spitz's work to compensatory education is based on the assumption that if massive social and emotional deprivation slows child development, then the apparently slower intellectual development of low-income children must result from "deprived" environments. The most obvious fallacy lies in the equation of the massive deprivation of social and emotional stimuli which Spitz found in institutions to the conditions of relative economic deprivation of many low-SES and minority homes. There appears to be no demonstrable basis for this equation.

Ginsberg (1972) also points out that there is a tendency to label as deprived environments that are merely different. He takes a strong stand that the home and environment of the low-SES child is not a setting of deprivation in any of the ways that studies indicate would lead to child damage. Generally, there is no lack of handling and nurturing of infants; there is no lack of verbal communication to which children can relate; and there is a strong identification with the care-giving group.

Hebb (1949) concluded that systematic alteration of the sensory experience of young animals led to changes in the organization and regulation of the brain's activity. Lindsey and Ruesen (1965) identified alteration of biochemical or structural characteristics of animal subjects as a result of deprivation. The implication of such changes in the past would have been that they were permanent; thus, if deprivation in children produced biochemical or structural changes, such changes might also be expected to be permanent. Harlow questions the interpretation of these studies, however, even for animals, since the variables measured have such large interactive effects with emotional and temperamental variables (cf. White, 1973, p. 97). In addition, it has not been shown that such changes are permanent either in animals or humans.

Scott and Harlow experimented with social isolation at birth of subhuman primates and found that it led to severely maladaptive behavior in adolescence and adulthood. Thus, monkeys who had not been mothered did not know how to mother their own infants. One implication of these findings for educational theory is that the effects of deprivation might be transmitted from parent to child. If extended, this idea might be used to explain that deviant (low-SES) parents were incapable of adequate parenting and that the intervention of society would be necessary.

Bowlby (1951) began to explore the effects of a disrupted mother-infant relationship in humans, and both conducted and reviewed much research. Yarrow (1964) contributed a useful distinction between maternal deprivation and maternal separation. From this work it appears that the lack of a mother may indeed have severe effects on emotional-social behavior. The absence of the child's own mother has less severe effects, especially if the natural mother is replaced by a single care-giver who provides adequate nurturing.

Burton White (1971) worked with children who had been institutionalized at or just after birth, and who had later been placed in normal homes, and compared them with those who had remained in institutions. He found that children who had been placed in normal homes had much better behavior, social, and emotional patterns than those who had remained in institutions. His results demonstrate that deprivation by institutionalization in early infancy is reversible, and that when the child is placed in a normal environment, additional steps are not necessary to produce a significant reversion to normal behavior patterns. His study did not involve any early childhood intervention in the sense that the term is used in compensatory education, but rather studied a massive change in environment that continued over a long period of years. If anything, White's work is an argument for the need to sustain educational intervention over the entire length of the primary and secondary school experience, rather than to put an emphasis on a one-shot intervention effort at the preschool or elementary school level.

Reversibility in some of the effects of infant deprivation was also noted by Harlow et al. (1966). In particular, he noted that subhuman primates which were reared in social isolation and subsequently severely mistreated their first-born infants were able to cope much more effectively and normally with the second and succeeding infants. This may indicate that the ability to "learn" is not lost in such cases. Gluck and Harlow (1971) report further studies on the performance of intellectual tasks by social isolates, and provide strong presumptive evidence that learning or intelligence was not much affected by the original deprivation, even though social and emotional behavior was affected.

More recently, Kagan (1973) found that infants in some Guatemalan Indian villages customarily experience extreme sensory deprivation in that they are left alone in relative darkness, rarely tended, and receive little maternal nurturing. If the theories of infant deprivation are correct, such an infancy should produce marked permanent damage to the child. Yet children 11 and 12 years old who had been raised in exactly the same way were healthy, friendly, socially well developed, and although their cognitive attainment had lagged somewhat along the way, by the age of 11 or 12 they had reached essentially the same levels as children raised in a more normally stimulating environment.

It appears clear that severe sensory and emotional deprivation in infancy, combined with isolation from prevailing cultural patterns, can result in long-lasting patterns of socially maladaptive behavior. It also appears clear that there are some situations under which these patterns can be altered. It may be, for instance, that it was not solely the deprivation in infancy of institutionalized children that made their outcomes so unfortunate, but also that deprivation continued throughout childhood combined with the fact that institutionalized children are not accepted as full members of their cultural community. The work of White and Kagan suggests that the ill effects of deprivation in infancy may at the very least be ameliorated by entry into "normal" family life, and by healthy participation in the intellectual and social life of the community.

It also appears clear that even the term "deprivation" has been used to refer both to a situation in which an infant is deprived of maternal nurturing and social interaction and to a situation in which an infant is born into a low-SES family. The two situations are far from similar. The latter usage must be treated with great caution. Increasingly, researchers have documented the emotional, cultural, and linguistic richness of what had previously been labeled "deprived" subcultures.

Finally, it would appear from the research literature that, except for some interactive effects, there is no special reason to believe that even severe infant deprivation necessarily leads to intellectual impairment, and that in any event there is some tendency toward "normalization" as the subject (animal or human) matures.

Enrichment and Intelligence

The organismic paradigm gives rise to the assumption that enrichment of the environment will have significant and lasting positive effects only if provided during the period of early childhood. In exploring this assumption, it is first necessary to examine the concept of intelligence. The important question here is not whether it is primarily heredity or primarily environment that causes the differences in intelligence noted in all populations. Rather, we need to ask whether the differences that can be documented as the result of environmental situations necessarily support the idea that enrichment can be effective only in early childhood.

Scarr-Salapetek (1971) reviewed the literature on intelligence in terms of the two general theories: first, that genetic differences are the principal cause of differences in IQ, and second, that differences in IQ are principally caused by differences in environment. Scarr-Salapetek interprets studies of twins raised separately as supporting the second theory, while Jensen would interpret them as supporting the first. The controversy between the two points of view is extraneous

here; the point is that even an extensive study like that of Scarr-Salapetek does not examine environmental influence at particular ages, but outcomes of long-term exposure to different environments.

The work of Bloom (1964), on the other hand, has been interpreted to show that intelligence is achieved or formed principally before the age of 6. He found that adult IQ can be predicted with great accuracy by knowing IQ at age 6. However, this assumes more about the relationship of IQ to applied intelligence than most authorities have recently been willing to grant. It is necessary to know a great deal more about the actual relationship between intelligence and what is measured by IQ tests before Bloom's findings can be extended unhesitatingly to support the necessity of early intervention.

One of the pieces of research that has been seized upon as confirming the assumption that early experience determines the nature of later experience is the work performed at the Max Planck Institute on imprinting in newly hatched geese. Newly hatched birds follow the first moving object they see, and accept the researcher who is present at the hatching as their mother. That this experience colors the nature of their later experience is undeniable; maternal care provided by a researcher is likely to differ considerably from that provided by a goose. But although this research is impressive confirmation of the importance of early experience, as White (1973) points out, there is increasing doubt that such phenomena are irreversible, even in birds.

Dennenburg (1968) found that problem-solving ability for adult rats improved if they had been exposed to enriched environments before and after weaning. However, like most other animal studies of the time, the Dennenburg work did not explore the effects of enriched environments on the adult rat, only on the young animal. Rozenweig and Krech (1968) did a study on a wider age range of animals. They found that certain enriched environments were associated with significant differences in brain weight and biochemical activity, and that this was true in the same degree for both young and old animals. Thus it suggests that adult animals can also exhibit high plasticity and response to environmental change.

Heber and Garber (1970) have carried out a number of successful attempts at raising infant IQ by changing the early environment. They have worked with children of low-SES mentally retarded mothers, providing all day center care with a high ratio of trained staff from the first days of life and imposing highly structured hour-to-hour patterns for dealing with the children. The mean IQ of the experimental group was raised 33 points above the mean IQ of the control group, and the effects seem to be lasting.

The Heber and Garber experiments are distinguished from other infant interventions by the very high staff/child ratio, the extreme structuring of an hour-to-hour and year-to-year schedule of cognitive stimulation for the child, and the almost complete removal of the child from the home environment during the first five years. It appears likely that change in the attitudes and possibly the behaviors of the subjects' mothers was a reinforcing factor, but such effects have not yet been accurately measured. Although the dramatic effects on child's IQ are incontestable, the cost of this program vastly exceeds any other form of intervention, and serious political and sociological issues are raised.

Less drastic intervention programs have worked with the concepts of family intervention and parent training both in the form of traditional experiments and in the form of government programs. Homestart is a federal program that works with both children and parents to improve nutritional and learning environments in the home, but no formal evaluation of the effectiveness of this program is available yet. M. Robinson, of the Office of Child Development, reports early good results with work based on assisting mothers in learning how to raise their children, but again formal and complete results are not yet available.

No similar program of research has been carried out at other age levels. However, it might be appropriate to point out that there is historical evidence that the principle of massive change in the environment, together with a highly structured pattern of enrichment was used

in education in Tudor England and Renaissance Europe, beginning at puberty, and primarily with boys. (The effects of the system on girls appear to have been alarming enough that sermons were preached against it.) By the period of Jacobean England, the tutor had degenerated into the so-called "bear leader" who steered his adolescent charge around Europe to learn manners and languages, and attempted to keep him out of trouble. But in the earlier eras, the tutor was a specialized educator who had no other vocation and no other charge; he did not provide specialized instruction but rather specialized attention and guidance and general instruction in communication, reasoning, and strategies. This heavy investment of resources, combined with a program of travel that removed the boy from his familiar environment cannot be assessed on the basis of changes made in IQ or intelligence (concepts that would have puzzled the Renaissance thinkers in any case), but they did provide some documented and impressive alterations in competence.

It is difficult to see at this point how the structure of the existing formal educational system in the United States can implement any program of intensive enrichment of the infant's home environment and experiences, except by providing education to the parent (adult or adolescent). Therefore, it is difficult to see how such studies as have been discussed here are really relevant to early childhood compensatory education in its familiar form. More relevant are the reviews of Head Start and the numerous other U.S. early childhood education programs that have been carried out by Stearns and by White.

Stearns (1971) studied the effects of Head Start programs on intelligence and later school performance. She found that many programs had no noticeable effects, but that some did appear to raise IQ and to provide a stronger start in school. However, it did not appear that these good effects carried over into the school performance of the students, and IQ effects appeared to dissipate over time.*

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*A more extensive discussion of this literature, focusing on the reviews by Stearns, Bissel, White, and Brontenbrenner is available in EPRC-RM24.

White (1973) carried out a comprehensive review of all government involvement in early childhood education programs. His report, clearly the most extensive and up-to-date study available, is important enough that it would be unjust to summarize it here in any detail. Briefly, however, he found that compensatory programs in general "offer little evidence of positive overall impact on eligible and participating children" (White, 1973, p. 22). He did find that preschool intervention programs produced an immediate increase in IQ scores for most of the participating children, but points out that it is very difficult to determine whether this represents genuine intellectual progress, or whether it represents improvement in self-confidence, test familiarity, or learning. In any event, he found that the effects on IQ of most preschool interventions do not persist beyond the second or third grade (White, 1973, p. 23). In a commentary on this review, Carl Bereiter remarked:

> Ten years ago there was no decisive but an abundance of suggestive evidence supporting the hypothesis that early childhood education and experience is crucial to cognitive development. After a decade of extensive basic and applied research, we still do not have any decisive evidence, but the trend of suggestive evidence has been rather consistently against the hypothesis.

One point that most studies do agree on (e.g., Bereiter, 1974) is that the compensatory education and preschool intervention programs that seem to be most effective in raising IQ scores are those that are most highly structured.

In any case, the actual results of early childhood compensatory education programs do not support the assumption that enrichment in early childhood (but beyond infancy) has lasting effects that can be measured. Given these results, it seems reasonable to examine other theories of intelligence that may support a different concept of compensatory education. There are studies indicating that intelligence

is more flexible, more differentiated (i.e., there are many types of intelligence), and more prolonged in its development than was assumed by, for instance, Bloom.

Horn and Cattell (1967) suggest that there are two general kinds of intelligence which they call fluid and crystallized. Fluid intelligence in their view is genetically determined, reaches its peak in adolescence, and is not influenced by learning. Crystallized intelligence, however, continues to grow until old age, and is subject to increase from experience and learning. This division of intelligence corresponds to intuitive notions of learning and the instructional function of schooling.

Bayley (1970) carried out some research that would appear to support the intelligence model of Horn and Cattell. Bayley determined that IQ continued to increase even after adolescence (to age 36 in males and age 26 in females). She cites also results by Owens showing that subjects retested at age 50 have higher scores than they did at 19 as college freshmen. In addition, she points to studies by Miles and Miles, Jones and Conrad, and Wechsler, which show similar longitudinal increases in IQ.

If IQ can be increased by environment and experience as well as by infant enrichment, then at least two possibilities must be considered. First, potential intelligence may be far beyond what is usually developed in the customary patterns of child development and education. Second, IQ may measure some component of intelligence that is not genetically determined. There is a third possibility that is a correlate of the second: IQ may not measure some of the important components of intelligence that make a difference in life outcomes. Similarly, some of the recent experiments involved with the validation of Piaget's stage theory raise important issues about the relationship of either IQ or SES to the attainment of a particular stage of reasoning capability, and in turn to the ability of a child to learn concepts.

If IQ is related strongly to intelligence, there should be a strong relation between IQ and success in adult life. Jencks (1972), after extensive path model analysis, estimates that the effects of family background and economic status are far more significant than the effects of IQ on school attainment, occupation, or lifetime income. Bowles and Gintis (1973) found that when social class and years of school are held constant, they are each several times more predictive of economic success than is IQ. Husen (1969, 1974) finds some correlation between IQ at age 10 and job success, but also finds that amount of formal schooling and social class are far more important contributors to economic success than IQ.

The concept of social class, of course, provides a point of discomfort. If socioeconomic status is more important in determining adult life outcomes than intelligence, then the whole point of many compensatory education programs is invalidated. Because this is such an uncomfortable position--and intuitively wrong--it would be interesting to explore the question of exactly what high socioeconomic status contributes toward a successful life outcome. One very likely hypothesis is that high SES provides or encourages the development of competence in dealing with situations, circumstances, and events that contribute to a successful life outcome. If that should turn out to be the case then perhaps there are aspects of competence that could be transmitted by the formal educational system when the socioeconomic status of the child does not provide them outside of school. (Roger Ascham, in the 1500s, pointed out that the sole purpose of education was to make it unnecessary to learn everything by experience.)

In summary, there does appear to be evidence to support the hypothesis that a highly structured, intense, and long-term enrichment in infancy can lead to positive effects on individual traits, including (perhaps) intelligence, and definitely including IQ. However, substantial doubt must be raised regarding the persistence of IQ gains and other benefits from limited educational interventions during early childhood.

Nor does it appear that the possibility of attaining positive effects of enrichment, including enhancement of IQ, is limited to interventions during early childhood. Instead, it appears that long-term enrichment (entering a normal family life after being in an institution, being raised in a more stimulating environment than an identical twin, entering into full community life after an isolated infancy in semi-darkness as the Guatemalan Indian child does, having a stimulating job in adulthood) may be the most effective.

The organismic paradigm explored in this section appears to have some serious deficiencies, particularly as it is expressed in most compensatory education programs for young children. Whether the purpose of compensatory education is to raise IQ or to improve the life outcomes for disadvantaged children, it seems imperative that we now move beyond a simple acceptance of the organismic paradigm to explore the value of other models, particularly those which can account for more flexible theories of intelligence, competence, and cognitive development.

III RESEARCH ON ADOLESCENCE

Adolescents have a distinct and unpleasant image in American society. At best, they are treated with frightened amusement:

> Adolescence is a disease. It may not be listed in the medical books as such, but that is only because doctors are embarrassed to be reminded of something in the presence of which they are so helpless. Like the common cold, there is no cure for it. Unlike the common cold, nothing can be prescribed, such as aspirin, which will give the patient temporary relief. The most that can be done is to give aspirin along with a shot of whiskey, to those who are unlucky enough to have come in contact with the victim.
>
> (Armour, 1963, p. 19)

At worst, adolescents are treated with open hostility, such as that of the federal Title I official who said: "All they do is mug people and shoot up heroin--I can't see why we should try to help them." Adolescents are seen as irresponsible, emotionally unstable, academically unmotivated, and cognitively inept.

Adolescents and preadolescents have also been neglected by our national compensatory education strategy, compared with other age groups, most notably early childhood. In part this is a manifestation of a broader societal attitude of ambiguity toward those who are neither children, strictly speaking, nor adults.* But in part it also reflects a particular confusion over the place of the adolescent in the

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*That this is so, is apparent through so simple a task as trying to find neutral words to describe the age group. We have our choice of adolescence, puberty, juvenile or teenager, older child or young adult, all of which evoke varying degrees of unpleasant images for Americans. Recently, advocates of this age group have adopted the term "youth."

school system. Specifically, this ambiguity appears to be the result of

- An underestimation of the ability of early adolescents to deal with intellectual complexity,
- A lack of understanding of the cognitive development during preadolescence and adolescence,
- An overestimation and misinterpretation of the influence on learning of personal and social characteristics during early adolescence, and
- Ambiguity and a sense of helplessness about the role of schools for disadvantaged youth.

A fifth and separate reason for the comparative neglect of adolescents is the dominance in compensatory education theory and research of the "early childhood" movement. Section II of this report has dealt at length with the rationale of this movement.

We will attempt to examine in some depth the theoretical and experimental research pertaining to adolescents. As a general rule, we have confined ourselves to the literature of the last fifteen to twenty years, although a few exceptions are made. Overall, the research on adolescence is voluminous, but it is bulk without consistency. For example, studies of the social and emotional maladjustments of teenagers burgeoned during the mid 1950s, but the quantity of writing in this area far outweighs the importance or validity of the subject to general education. By contrast, the sparseness of thinking and research on the cognitive development of adolescents severely underrates the importance of this field and its potential complexity. These limitations must be accepted as a starting point.

The great unevenness of the research literature, and its comparative thinness in the area of greatest interest here, mean that we cannot reach any unassailable conclusions. Nevertheless, there is an abundance of suggestive evidence on questions of great importance, and to ignore such evidence solely because it is less than perfect seems

counterproductive. At the least, some useful light can be shed on such questions as:

- What is the nature of intelligence and cognitive functioning in early adolescence? How do these differ, if they do, from intelligence and cognition in earlier childhood?
- Is intellectual competence during adolescence affected by competence in earlier childhood?
- How is intellectual development in adolescence related to emotional and social development?
- Do schools play a special role for disadvantaged adolescents? What can we ask or expect of the schools in this situation?
- And, finally, what have been the results of attempts at remedial education for disadvantaged adolescents?

Intelligence and Learning in Adolescence

Theoretical Positions

Traditionally we have operated according to an unstated model in which learning is presumed to be a cumulative process. The learning process is thought to be uniform throughout life and across all subject matters. There is no good explanation in this model for how learning occurs, except that it is presumed to be sequential and cumulative. One thing must be learned before the next, and each step is of approximately equal value and difficulty.

Within the last twenty years, there has been very broad acceptance of theories of staged learning. In these theories, various kinds of learning have varying degrees of conceptual complexity. The ability to understand conceptual complexity increases irregularly as a child develops. The most widely studied and accepted theoretician in this field is Jean Piaget.

Piaget (1970) posits that development occurs in sequential stages. Each successive stage comprises different and more complex structures that allow the child to perform operations and intellectual tasks different from those possible in the previous stage. The three major stages in Piaget's scheme are:

- The sensorimotor period (typically, birth to perhaps 18-24 months)
- The period of representative intelligence
  - Preoperational subperiod (approximately 18-24 months to 6 to 7 years)
  - Concrete operations subperiod (approximately 6-7 years to 11-12 years)
- The propositional and formal operations period (approximately 11-12 years to 15-16 years).

A sequential and invariable order is followed in which each stage is in some way necessary to the construction of the next. A stage is constructed by the joint action of four elements:

- Maturation
- Experience of the physical environment
- Action of the social environment
- Equilibrium or self regulation.

It is the interaction of these four elements that determines when a particular child, or group of children, moves from one stage to the next, and clearly there may be considerable individual and cultural variation. For our purposes, it is important to note that a child cannot assimilate, comprehend, use, or retain the concepts at a given stage of intellectual complexity until he has reached that stage of mental complexity himself.

Bayley (1970) has come to a similar theoretical conclusion from her longitudinal studies of children's scores on a variety of intelligence and ability related tests. She concludes that not only the

quantity of mental function, but also the quality and patterns of mental function change over time. Furthermore, she finds that "superiority in one function does not insure superiority in the subsequent development of more complex functions." Her work and that of Piaget agree that there is no logical necessity that adequacy in any stage be dependent upon or predicted by adequacy in an earlier or later stage.

Gagné (1970) presents a somewhat similar theory of stages. He hypothesizes that a higher stage is reached or a qualitative change achieved when small steps of learning accumulate and are integrated hierarchically. Within this theory, the attainment of a new stage is, in his view, independent of maturation or preprogrammed cognitive structures. Thus, stage attainment is not tied to a specific age, but varies greatly with the richness and structure of the environment.

Another variation is espoused by Pascual-Leone; in his theoretical model, stage attainment is determined by the three factors of

- Mental space
- Specific configurational schemes such as vocabulary, propositions, numbers, images
- Executive strategies, used to operate on configurational schemes to solve problems.

Pascual-Leone hypothesizes that all three factors increase with age and that all but mental space depend on learning and experience. For experimental attempts to verify the Pascual-Leone model, see Case (1973, 1974).

Another model of intelligence which fits nicely with these is the Horn and Cattell model based on "fluid" and "crystallized" intelligence. Fluid intelligence is hypothesized as being genetically determined, and reaches its peak at adolescence. Crystallized intelligence is posited to depend upon learning and grows until old age.

At first glance, the existing theories appear to be persuasive and numerous. A common difficulty is their lack of detailed specificity and substantiation in terms of process. That is, they are able to say

what happens and to offer some persuasive theories about how it happens, but there is no indication of why. Unfortunately, this is a problem which is still shared by almost every theory in the fields of psychology and education.

We are inclined to conclude that the theoretical bases for the assumption of some qualitative differences in adolescent cognitive functioning are sufficiently well developed to be accepted as reasonable working hypotheses. Along with the theories, then, for the time being, we accept the idea that intellectual functions go through qualitative changes around the time of early adolescence (approximately ages 11 to 15). These changes are referred to by the code phrase "formal operations."

Formal Operations*

Broadly speaking, the stage of formal operations is characterized by the acquisition and use of a number of abilities not available to children in earlier cognitive stages. These abilities include:

- The consideration of propositions which are contrary to fact
- The identification and consideration of all the logical components of a set
- Understanding and construction of conceptual hierarchies
- Abstraction from the particular to the general case (deduction), and the converse (induction)
- The use of internalized speech.

This listing can be compared with the concepts used by Inhelder and Piaget (1958) and by Elkind (1970).

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*A helpful discussion of the essence of formal operations can be found in P. G. Richards, An Introduction to Piaget (Harper Paperbacks, 1970).

Elkind writes that

> "The major task of early adolescence can be regarded as having to do with the conquest of thought." (1970, p. 119.)

and that

> "The adolescent can accept a contrary-to-fact premise and proceed with the argument as if the premise were correct. Once again, the capacity to deal with the possible as well as the actual liberates the adolescent's thought so that he can now deal with many problems, situations in which the child is stymied. Most importantly, for our purposes, the capacity to deal with the possible means that the future is now as much of a reality as the present and is a reality which can and must be dealt with." (Elkind 1970, p. 76-77.)

Research to substantiate and specify these abilities is quite uneven. Most of the work that has been done deals with the development of memory abilities and strategies, and the new uses of language in formal operations. A review and partial synthesis of these studies will be followed by a more extended discussion of two bodies of work which may help us to deal with a more difficult question.

Memory and Strategy

Investigations by Bruce (1974) find that a child's ability to recognize and utilize structure as a way of facilitating learning increases with age.*

Experiments by Griffin, Spitz, and Lipman (1959), and by Furth and Milgram (1973) indicate that immediate memory span and capacity to recognize and manipulate categories increases significantly in preadolescence. This enables children to process and retain progressively

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*An interesting sidelight is the finding of Bruce that less complex structures were actually more facilitative for groups in sixth through eighth grades.

more information after ages 9 or 10. This phenomenon was also established by the experiments of Howvitz and Levin (1972) and of Cole and Kanak (1972), in which it was found that associative learning ability increases with age. This is in keeping with the finding of Rohwer and Levin (1971) that older students (age 11+) are able to utilize a wider variety of clues to stimulate both the recall of and attention to associate pairs than can younger children. Among others, Guttman and Schlesinger (1967) have constructed instruments to measure the ability to use unobtrusive and concealed cues and to apply them in generalizations and abstractions. Preadolescents showed quantitative gains and qualitative changes in their performances, compared with younger children.

Ornstein (1973) suggests a somewhat similar hypothesis. His experiments with children of various ages indicate that retention rates are significantly augmented as a child acquires multiple contexts to which he can relate and through which he can remember new material. An interesting difference between Ornstein's work and the other work cited is that Ornstein's work suggests that the memory of adolescents is increased by the increase in experience per se (throwing the greatest weight on the environment), and the work of others tends more to suggest some factor of internal maturation which is, to a greater extent, independent of the environment.

Two other studies are of particular interest here. Nuessle (1972) found that adolescents are more effective than younger children in distinguishing between pertinent and irrelevant hypotheses when required for problem solving. Finally, Sheingold (1973) has attempted to attack the central problem of the relation of cognitive skills development to sensory perception. She studied the receptivity of four age groups (ranging from 5-year olds to adults) to visual information. Findings of this study indicate that the intake capacity of the two groups did not vary significantly, but that the older subjects used active strategies for processing and retaining this information, while the younger subjects did not.

Verbal Skills and Reasoning

Verbal symbols can be used increasingly in adolescence as mediators of conceptualization, for instance, in perception across sense modalities. Verbalization also becomes an important factor in problem solving.

As verbal concepts are manipulated, combined, and arranged in multiple order hierarchies, they become increasingly powerful "tools of the mind" (see Bruner). Adolescents can manipulate symbols in a way that makes their thought much more flexible than that of the young child. Words carry much more meaning when they can both denote things and symbolize ideas. Young children, on the other hand, seldom understand metaphor, double entendre, or cartoon (Elkind, 1970a, p. 76).

The increasing objectivity in the mental operations of the preadolescent and the teenager affects the quality of the basic organizing concepts they use and allows them to go beyond the specificity of space, time, situation, and their own subjectivity. The adolescent or preadolescent can understand a legal position. In a conversation, his sense of language includes the handling and transfer of grammatical rules, even when the language is not Standard English and does not have a formal base (e.g., pig latin, street language).

Blos (1962) calls attention to the observations of earlier writers about the dissociation of verbal expression from motor activity with maturation. The expressive use of the whole body to reflect the inner life, which was typical for the younger child, diminishes. The preadolescent can use language to veil his inner states and wishes, and to separate public and private worlds.

Internalized speech is important in the attainment of silent reading. Kohen-Raz (1971) sees the preadolescent's ability to learn the use of written language as the product of reintegration

of internalized and external-socialized speech.* "Written verbal expression is based on the swift current of thought that is only possible by virtue of an internalized language" (Kohen-Raz, 1971, p. 71). However, internalized language can be translated into writing only if molded into the language of written style and syntax.

By the end of preadolescence, higher-order concepts can be handled, but their formation and use is heavily dependent on the range of vocabulary (see Wolman and Baker, 1965).

In contrast to the adolescent, young children have limited ability to generalize or think abstractly and conceptually, and they tend to use verbalized information inaccurately (Joyce, 1972, p. 256). This puts serious limitations on the amount of understanding and the level of teaching which is possible before preadolescence in any of such subjects as natural science, social science, history, geography, and mathematics; and such teaching is not possible, even in a rudimentary form, in preschool. Young children may learn words, imitate language, and use a certain amount of imagery, but only with preadolescence will they reach the stages in which they can learn the accurate meaning of concepts, methods, and ideas of scientific disciplines.

In adolescence, verbal symbols can be used increasingly to mediate conceptualization and thereby become an important factor in problem solving. The relation of this ability to the construction of logical hierarchies seems particularly important.

Stage Acquisition

The stage theorists discussed above agree that the responsibility for cognitive development is shared by inherent (genetic) and environmental factors, with the latter predominating.

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*This view is based on an integration of the theories of Werner and Kaplan (1963), and Vigotski's (1962) findings as well as on Piaget's concept of decreasing egocentricity.

This would seem to be borne out by the few pieces of research that are available. Certainly Piaget's work suggests that, within limits,* it is possible to draw an individual from one stage and into the next by restructuring and deliberately directing the child's interaction with the environment. Kagan's work in Guatamala also seems to offer indirect support for the hypothesis that the general social and cultural environment exerts a strong influence on the timing of stage acquisition.†

This leaves unanswered, however, the question of whether stages are, in everyday language, "all or nothing" propositions. Does stage attainment mean that all the individuals in a given stage can and will demonstrate equal accomplishments? This seems almost out of the question. Some children are obviously better at certain tasks (physical, social, or intellectual) than other children, even when all understand the nature of the task and the steps that must be taken to complete the task. Rather, stage attainment seems to be more like the possession of a tool kit; the uses to which the tools are put and the quality of the products may still be subject to both hereditary and environmental influences. Still, in a sense, if everyone has the same set of tools, all are "starting out equal."

Two important studies seem to indicate that to attain the stage of formal operations is really only to acquire some rather general intellectual potentials which must still be actively converted into achievements. The first is a study conducted by Frankenstein (1972) involving the low-SES, minority, poorly achieving students of a Jerusalem high school. Statistically and observationally there was very little hope that any of these students would be able to pass

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*These limits have not been carefully explored, but the range of flexibility for any individual child seems more likely to be on the order of months rather than years.

†In cross-cultural studies it is extremely difficult to separate the influence of genetics from that of environmental factors.

national university entrance examinations. Frankenstein hypothesized that these students were unable to translate basic cognitive capabilities into effective problem-solving strategies. In his experimental project, the actual thinking patterns of the disadvantaged students were analyzed in order to identify faulty or unsophisticated patterns of thinking. The project then helped the students to contrast their own patterns with the characteristics of higher order conceptualization and directed the students toward strategies that helped them develop the desired patterns of thought.

A second body of work which is of interest here is that of Kohlberg and Gilligan (1972), and Kohlberg (1973) in "moral reasoning."* Their investigations revealed that, starting at about age 10, adolescents might adopt any of six different types of moral reasoning. These six types formed an invariable sequence; if a student changed his style of moral thought, it was invariably by the adoption of the next "higher" (read "more abstract") principle. However, some students progressed further and/or faster than others. Kohlberg attributes the differential attainment of moral stages to differences in the structure and demands which are made by a student's immediate environment. It was demonstrated that students could be induced to move to the next higher stage of reasoning provided (a) that the teacher could accurately diagnose a student's present stage, (b) the teacher could pose a problem that reflected the next higher level and himself act according to the model of that level, and (c) the student was afforded opportunities to discover the inherent conflict and try out a different mode of reasoning. Kohlberg implies that all or most of the adolescents were capable of attaining the highest levels, but that only those whose environment demanded it would do so.

These studies have been discussed at length because there have been so few other studies that throw any light on the very central

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*Kohlberg defines "moral" as following "rational principles of judgment and decision."

research problem of the meaning of stages. But an equally important reason is that the findings they report may bear directly on the question of the role and effectiveness of compensatory education for adolescents.

Social and Emotional Factors

All of the experiments discussed in the preceding parts of this section point clearly to the specific and effective cognitive abilities of early adolescents. They suggest that the years of early adolescence should be an excellent time for rapid and effective learning. Such a suggestion, however, clashes with our traditional notions of the interests and potential of students of junior high school age. Some of the common assumptions that our society makes about adolescents are belied by recent research.

Psychoanalysts, particularly, have drawn a picture, starting at puberty, of a state of personality development that approaches psychopathy. Unpredictability, moodiness, exaggerated states of feeling, and other characteristics during adolescence that are deviant from the adult norm (see, for example, Wiener, 1970, pp. 21-23) are used to explain why adolescents do poorly in school. "As the adolescent moves away emotionally from the parent as an auxiliary ego, in this necessary process he is beset with tensions, feels guilty and sad over the loss of his love object, and is threatened by his own instincts .... In the struggle to regain control over his impulses ... occurs disruption of ego continuity, resulting in narcissistic injury ...."

> "It has been said that adolescence is the 'heyday' of the emotions. High school pupils have been described as giggling, erratic, vivacious youth. They change their moods rapidly, and one is never sure what mood will be dominant on any occasion. They may shout, cry or be solemn at a football game and giggle in church at one time and be moved to tears a few moments later. Often they will be defiant of authority, show a disrespect for old age, or show such inconsistencies as to write an essay on respect for law and

then show no respect for it. In school, they will occasionally doubt well-established fact. They are secretive, and romance seems to be a part of their lives. Temporary success elates them, and failure depresses. Their pride and vanity are easily flattered and wounded. Their emotions seem to drive them from one extreme to the other." (Bent and Kronenberg, 1961, p. 81.)

The distortion and misunderstanding of the social and emotional developments of early adolescence have perhaps done more to discredit this age as a time for learning than any other circumstance. A more dispassionate examination of some of the existing research evidence can assist in relating the psychological developments of early adolescence to the cognitive potentials of the same period.

Formal Thought and Personality Development

Early adolescence is accompanied by an increasing interest in the self and in other people, as well as by qualitative changes in self- and other-orientation. Such changes seem to be related not only to emotional development and the move into new social role patterns but also to the increasing thinking power in this age group.

"As is evident from various investigations, it is only at pre-adolescence that the child's thought achieves independence from egocentric and instinctual fantasies to the extent that he is able to construct an overall realistic and rational picture of the universe" (Kohen-Raz, 1971, p. 43). With the approach of adolescence, a new dimension in the representation of self and reality is added through progressive cognitive development.

The young child does not distinguish easily between his own thought products and reality. As Elkind has shown in his studies of religious development (Elkind, 1961, 1962, 1963), it is not until about the age of 11 or 12 that children begin to reflect upon their own throught processes. Also, young children are not aware of their hypotheses in thinking. "In the adolescent, on the other hand, thought and

experience are clearly differentiated, and the adolescent is well aware of the arbitrariness of his hypotheses and their lack of necessary connection with the facts" (Elkind, 1970, p. 130).

This development coincides with the emergence of formal thinking. "From a developmental standpoint, formal operations may be a precondition for the acquisition of highly cognitive ego mechanisms such as discrimination and detachment" (Elder, 1968, p. 18). For instance, "formal operational thought not only enables the adolescent to conceptualize his thought, it also permits him to conceptualize the thought of other people. It is this capacity to take account of other peoples' thoughts, however, which is the crux of adolescent egocentrism ... he assumes that other people are as obsessed with his behavior and appearance as he himself is" (Elkind, 1970a, p. 119).

Survey data tend to corroborate this. The interest in personal characteristics has been found to increase in the years from 11 to 16 (Survey Research Center, 1960). This has cognitive significance because it leads to greater accuracy of self-perception, which Offer (1969) observed as being high in his "normal" adolescents. The increased interest in personal characteristics may also facilitate the attainment of a final distinction between self-perception and how others see oneself.

The development and sophistication of attitudes towards the self has another aspect which is closely related to general cognitive complexity and increasing interest in the self--namely, the extension of the future perspective, the interest in self-ideals or heroes, and the corresponding increasing relevance of goals in the personal future. Piaget and Inhelder (1958) noted the anticipatory quality of adolescent thinking, which is oriented towards the future and committed to future possibilities, in which the idealistic component tends to be strong. Donvan and Adelson (1966) noted that the adolescent view of the future influences activities in the present (cf. Elder, 1968, p. 19).

The adolescent's tendency to apply his newly gained thinking power to societal as well as scientific problems could be an instance of

White's (1959) so-called effectance motivation--a natural motivation to become competent and master new potentials, and develop them fully so as to be used for effective coping with the environment.

Research in the Humanistic Education Program at the School of Education, University of Massachusetts, is leading to data which corroborate and amplify the interrelation between cognitive development, self-concept, and other observations about adolescent development. In this work children of various ages were asked to compare how they had changed from when they were younger and how they expected to change in the future. Children of 4-6 years of age referred to themselves in very concrete or materialistic terms, whereas students of 13-14 and beyond use psychological characteristics and are able to discriminate clearly between feelings and thoughts, their own as well as others. Tenth graders also use a kind of reasoning about themselves that sees certain behaviors as reactions to feelings or states of the mind. For instance, if they feel shy in a social situation they react in a certain way, like turning away and stopping conversation (Personal communication from Judy Evans, June 1974).

With respect to the psychological incapacitation assumed to be the consequence of adolescent inner turmoil and emotional upheaval, Winder (1970, p. 68) concludes that "studies of normative and normal samples of adolescents demonstrate that adolescents in general are no more likely than other segments of the population to display features of psychopathology, and that there is little basis for anticipating psychological disruption and maladaptive behavior in normal adolescents."

Thus, although the internal characteristics of the adolescent have been believed to render any educational effort wasteful--since the teenager is assumed to be so busy with his own problems that nothing can touch him--the personality changes that are occurring seem to be instead, those that are conducive to learning.

Adolescent Social Values

There is another image of the teenager that affects how he is viewed by educators. This is the assumption that teenagers have a separate subculture (Smith and Klein, 1966) and have values, attitudes, and beliefs that are radically different from those of adults. From this, it is argued that the teenager is so strongly against anything that is adult, or associated with school achievement, that he is impervious to educational treatment.

This view seems curiously American. Not in all societies is adolescence considered a special age characterized by deviant behaviour or disinterest. On the basis of field work in an Ijaw village in Nigeria, Leis (1962) describes the age group from 9-13 as "the age of responsibility," and adolescence from 14-17 as a period of "consolidation for adulthood." From 9 years on, boys and girls start to take over duties of social significance; if they failed or behaved irresponsibly, it would endanger other people's survival or welfare. "Adults believe a nine-to-thirteen year old should perform tasks and assume responsibilities as a natural part of growing up" (Leis, 1972, p. 72). Instruction in tribal beliefs and values was part of the final stage of enculturation for the adolescent. This pattern is basically the same in most of the traditional African cultures.

That the adolescent storm and stress is not a biologically determined universal condition but is determined by the surrounding society and culture was discussed by Margaret Mead as early as 1939. Since then, studies in cultural anthropology have shown again and again that American generalizations on the psychology of teenagers cannot be accepted as universal phenomena. For instance Hsu et al. (1974) found that Chinese adolescents in Hawaii showed comparatively few problems in their transition to adult life.

Empirical studies do not support the notion of a basic value conflict between adults and teenagers in the United States or the notion of extreme rebelliousness. Hess and Goldblatt (1957) compared ratings of teenagers and adult family members about themselves and each other

on socially desirable traits. Both adults and adolescents each assumed the other thought much more negatively about them than was the case. The adults, for instance, believed that the teenagers undervalued them, whereas the teenagers tended to idealize them and had a better opinion about adults than the adults had about themselves. Meisner's (1965) investigation of 1,278 high school students provided evidence of their positive views of parents, with gradual disengagement from parental authority instead of rebelliousness: 94% of the students are proud of their parents, 89% report that they are happy in their homes.

In a longitudinal study of 73 high school students, an attempt was made to uncover the personality characteristics of the modal, normal teenager (Offer, Sabshin and Marcus, 1965; Offer, 1967; Offer, 1969). It became evident that the average teenager had positive relationships with his family and had few intense conflicts with parental values. They viewed their fathers as reliable and knowledgeable and their mothers as understanding and sympathetic. However, they were critical of themselves, although their own coping behaviors in regard to emotional experiences like sexuality or aggressive impulses were judged to be competent. These students were optimistic about the future and expected their aspirations to become reality (Offer, 1969). The overall picture was one of restraint and conservatism. Sharing of parent's values and conservatism plus avoidance of inner and outer conflicts were also the characteristics Donvan and Adelson (1966) found to be typical of the average adolescent in their sample of 3,000.

Like the assumed conflict between teenagers and adults, the assumed association between adolescent developmental characteristics and low motivation for school is not universal. In Germany, for instance, the most important time for learning is assumed to start with the age of 10 or 12, after changing from elementary school into the Gymnasium, and not in the early elementary years. The adolescent is expected to feel responsible for his own learning and to be able to take intellectual pursuits seriously (if he is in the Gymnasium, that is). The apprenticeship system also presupposes the assumption that extensive new learning can take place in adolescence.

A representative national survey of 11-13 year olds in the United States (Survey Research Center, 1960) showed that 54% of the boys had a paid job, indicating that in modern societies, too, students of this age can carry out duties in a responsible and reliable way. The data show furthermore that the 11-13 year olds feel most important when they take over a responsible adult role around the house. For more than half of them, family members are the people most admired. Among their concerns, school achievement and doing well is of highest priority, more so than acceptance by others or personal characteristics. In the survey a large proportion of them reported wanting to be professionals in their adult life, which would seem to indicate a strong acceptance of traditional adult roles, and probably of adult values as well.

Weiner (1970, p. 13-31) reviewed various studies carried out between 1936 and 1966 on nearly 11,000 students between 10 and 19 years old which overwhelmingly corroborated this picture: Symonds (1936), Harris (1959) and Kasckowski (1962) found that study habits were always of highest importance. Adams (1964, 1966) in a study of 4,000 teenagers found that school achievement was the most frequently mentioned concern. Also Meissner (1961) and Abel and Gingles (1965) found that school problems were the major source of worry among their subjects. Keislar (1953) studied how much prestige was associated with various behavioral characteristics of 10th graders. In contrast to such findings as Coleman's (1967), he found that effort in school work and cooperation with teachers was more highly correlated with prestige than sociability.

Thus, extensive and reliable research studies in the United States do not support the image that the majority of the teenagers are deviant, difficult, rebellious, and unconcerned about school.

Cognitive Development and Education

Finally, we arrive at the consideration of how to relate what is known about adolescent cognition in general to the specific situations of learning academic subjects. We may now also appropriately consider any special relationships of conditions that exist for economically and/or educationally disadvantaged adolescents.

Age and Subject Matter

Intuitively, it makes sense to believe that if abilities differ both in type and degree during different age periods and cognitive stages, then various subjects or skills may be more appropriately taught at different times. The general application of this idea is illustrated by the traditional arrangement of elementary, secondary, and tertiary curricula. However, surprisingly little controlled research has been done to explore or validate the relationships between subject matter and the ages or cognitive stages of students.

The largest body of research has perhaps been done on the subject of learning second languages. Here most of the evidence seems to suggest that young children (under about age 11 or 12) have a greater ability to learn the spoken aspects and vocabulary of second languages. A reflection of this is the number of elementary school programs in conversational French or Spanish instituted since the mid 1950s. Traditionally, however, intensive study of foreign languages has been reserved to the high school and college years. This rationale seems to be supported on two points. First, the study of second languages is often undertaken as a way of gaining access to writings of sophisticated content (literature or science), the understanding and appreciation of which is ordinarily beyond the grasp of most young children. Second, experience and theory would suggest that proficiency in the written and stylistic aspects of any language, including a foreign language, is possible only after formal operations have been achieved, allowing the complicated consideration of tenses, the understanding of a variety of linguistic organization schemes, and the distinction between written and spoken language.

A similar chain of reasoning supports reserving the study of most social sciences until after about age 11. The gradual development of meaningful social science concepts appears to be based in part on age-related abilities to understand concepts of time and space. For example, the appreciation of history seems to require an extended time perspective, an ability to conceive of (and an interest in) human and

institutional events outside accessible reality, and an ability to arrange concepts and hypotheses into hierarchies and complex patterns.

Piaget (1969) points to the fact that children develop an understanding of time and velocity in the early school years. However, as Joyce points out (1972, p. 256), "Many research studies have shown that children are slow to understand the concepts of space and time in a form recognizable by geographers and historians." Michaelis (1956, p. 74) concludes that historical time cannot be grasped by most children until they are in junior or senior high school.

It is easy to see that similar reservations must apply to the fields of psychology, anthropology, and economics. Kohen-Raz (1971, p. 151) states that the "gradual development of formal reasoning provides a basis for a series of arithmetic and mathematical skills that cannot be mastered before preadolescence."

These studies and theories, and our own experience, seem to give sensible outlines to the relationship of age to subject matter, given conventional teaching methods. Some of the most exciting research in education over the last decade has dealt with the development of teaching methods which may allow us to break down some of these relationships. Silberman (1973) has reported a number of the most impressive experiments in teaching to very young children many skills which are ordinarily reserved for adolescents. These suggest that, were we willing to break out of many of the standard constraints of methods, organization, and budget, at least some aspects of complicated subjects could be taught and learned much earlier than they now are.* Very recent work in the area of foreign languages similarly suggests that radically different

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*Perhaps the most impressive instance of this is Bruner's success at teaching calculus to second grade students. Their ability to use the methods of calculus seems amply demonstrated. Any ability to comprehend the underlying concepts or to derive the theorems themselves is far more questionable.

teaching methods may also allow adolescents and adults to acquire aspects of language which are ordinarily best learned by young children.* Silberman also presents a pointed discussion of why such innovations in method very seldom can be applied in any comprehensive way.

Educational Disadvantage

Finally, and very briefly, we must ask what, if anything, is known about the relationship of "disadvantage" (usually meaning minority, low SES, family background) to school learning. Despite considerable speculation, little research has been done in this area. The link between SES, educational disadvantage, and speed of learning the standard curricula of U.S. schools are still not clear. Since the early 1960s there has been widespread confidence in the assumption that low SES and/or minority status went hand in hand with educational disadvantage. The 1966 Coleman report (Coleman et al., 1966) effectively turned the assumption into accepted fact with its findings that low-SES children were far more likely to have substandard achievement scores than were children of middle or upper SES backgrounds. Numerous other researchers have elaborated this finding. However, a recent study by the Educational Policy Research Center (Emrich, Guthrie, Frentz, 1973) suggests that the extent of overlap between educational disadvantage

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*One such line of exploration is based on the theory and applied research of the Bulgarian psychologist Georgi Lozanov. Called Suggestopedia (the use of suggestive processes in education), this approach employs an active technique of "infantilization," in which the student acts out what he just learned as a life-like drama. In her recently completed doctoral research ("Suggestology, Research in Learning through the Method of Suggestion," United States International University, San Diego, CA), Elizabeth Philipov has theorized that the principle of infantilization transcends the notion of a "critical stage" for language acquisition, because it makes possible the reinstatement of states of consciousness similar to those in which a child's first language acquisition takes place.

(i.e., substandard performance on norm-referenced achievement tests) and low income for urban children has been overestimated.

In a similar vein, a study of Lengel and Buell (1972) of the application of higher stage concepts in physics concluded that grade level, and possibly a "hidden factor" of mental age, predicted the ability to use the concept of conservation better than did traditional measures of IQ or SES.

On the other hand, studies by Elkind (1971), Keating (1973), and Kagan (1971) suggest that SES or the general kind and quality of a childhood environment does influence gross age at which stages are attained. Kagan's work, for example, suggests that sensory deprivation and social isolation in early childhood may slow, but not halt, stage attainment and the general development of cognitive skills. The work of Elkind (1971) and that of Keating (1973) suggests that educationally disadvantaged children will be exactly those for whom the stages of cognitive development are attained later than the norm. If this is the case, it suggests that educationally disadvantaged (and/or low-SES) children may be equally able to learn both basic and complex skills, but at later ages than most of the school population. They might, therefore, benefit from receiving certain types of instruction later than other children, not earlier. Until far more is known about this, however, it would be highly inadvisable to institute large-scale curriculum changes in this direction.

Beyond this, what can we say or infer about the difference between low-SES and/or minority adolescents and their age counterparts in the mainstream? The most obvious difference is that the low-SES adolescent has more practical problems and fewer resources--external and internal--with which to cope with them. He is in a difficult life situation, at school as well as at home, while he must master the same psychosocial development tasks as the "normal" adolescent. In the United States, passage through the school system is required of all economic groups, although the experience of higher-SES adolescents is facilitated by wider choices of schools in which to enroll, prevalence of teachers

and counselors from their same socioeconomic group, a close correspondence of home-school values and styles of interaction, and greatly increased access to libraries, professional resources, and subject contacts.

The learning of the low-SES student is not improved or aided by the fact that many low-SES families and some ethnic groups may see education as a repudiation of traditional values and may distrust school (Katz, 1967). Apart from the "subtle but clear messages that reinforce the adolescent's disdain for the benefits of scholastic diligence" that parents with little schooling may send out (Weiner, 1970, p. 256), low-SES parents may lack the attitudes, skills, information, and orientation that would support the intellectual achievements of their children. The mere desire of a parent that a child succeed in school or "get an education" does not in itself provide the daily modeling and encouragement of the adolescent's strivings and behavior that are needed (see Argle and Robinson, 1962). Indeed, underachievers in high school have parents who are less encouraging with respect to achievement and intellectual interests and who contribute less to positive attitudes towards teachers and schools (Morrow and Wilson, 1961; Wilson and Morrow, 1962). Cervantes (1965) collected data on 300 respondents matched for IQ, school, SES, age, and sex and found that dropouts felt less understood by family members than those who stayed in school, felt less encouraged to pursue school, spent less of their leisure time with their families, and more often saw home as unhappy.

Taken together these factors suggest that even if a low-SES student survives the elementary school years and emerges on a par with his middle and upper-class peers, she or he stands an unequal chance of completing secondary education with such happy results and equal achievement. In fact, it would appear that the social and intellectual differences between environments place a greater burden on the task of intellectual development which faces an adolescent than they do on the comparable tasks of early childhood. Hence, the need for "compensatory" action on the part of the schools to make up this difference may be differently expressed, but needed as much during preadolescence and adolescence as during early childhood.

IV PROGRAM EVALUATION

It is a common plea among state and federal administrators that programs for adolescents are "less effective" than programs for students in preschool and primary grades. These declarations take a few standard forms. It is asserted, for example, that compensatory education for adolescents is ineffective in that:

- Grade equivalent (g.e.) gains are smaller in intermediate programs than in primary programs.
- Adolescent programs are less effective at moving disadvantaged students toward national norms.

If evidence or argument is presented that contradicts these articles of faith, opponents of adolescent compensatory education fall back on a small number of standard "explanations." The most popular disclaimer is that apparent gains in adolescent programs are only the effects of prior exposure to compensatory programs in previous years. Another favorite rejoiner is that large gains in adolescent programs are "easy to get" since students are so far behind to begin with, and therefore the gains are meaningless.

In order to examine the validity of these assertions, this study has gone to the basic information document in compensatory education: the state level report on the administration and the results of ESEA Title I during a given fiscal year. Over 231 of these state reports, spanning 50 states and the District of Columbia, spanning a 5-year period, were reviewed for the study. The U.S. Office of Education does not at present require any standard format for such reports, and they therefore presented great variations in the type and reliability of data published. In some cases the data problems were sufficiently severe to require exclusion of a report from the study. Thus we were left with a sample which was far from random, but included all usable

data from every available state report during the study period. From the broad data base, a variety of samples was constructed. For a technical description of the data base and samples, see Appendix B.

Funding and Participation

The first finding to emerge from the study of these state reports is that adolescents do indeed receive far less compensatory education than do younger children. Although not all states report the number of students receiving Title I assistance by grade level, many do so and others present statistics from which participation can be estimated. Estimates of participation by grade level were also available for some years from other sources. (AIR, 1972; and unreleased federal estimates.) Table 1 presents examples of the funding pattern for secondary level compensatory programs in 11 states over the period 1970-73. It also shows our estimates of national participation over the period 1969-73. Three points are clear from this table:

- In no state was participation in Title I programs allocated equally among elementary and secondary levels.
- In only one state (Rhode Island) had participation of students in the intermediate grades risen over time.
- Across the nation, the proportion of students in the intermediate grades receiving Title I assistance has dropped steadily over the 5-year period under study. From approximately 20% of the total in 1971, intermediate students accounted for only an estimated 16% in 1973.

This pattern is not in any way a violation of the federal laws. On the contrary, federal administrators are quite explicit in sanctioning local decisions regarding participation, and the distribution of funds and these state patterns can be very lopsided. On the other hand, it should not be assumed too easily that this is a pattern fully consistent with the intent of the law. Congress may not have intended the benefits of Title I go to only to primary grade children, since it enacted a specific "Elementary and Secondary Education Act."

Table 1

PARTICIPATION BY GRADE LEVEL GROUPS AS
A PERCENTAGE OF TOTAL TITLE I PARTICIPATION

State	1969		1970		1971		1972		1973	
	K-3	7-9	K-3	7-9	K-3	7-9	K-3	7-9	K-3	7-9
Arizona	NR	NR	NR	NR	38%	25%	40%	23%	48%	21%
Arkansas	NR	NR	NR	NR	30.2	23.8	NR	NR	28.9	24.8
California	41.8	20.8	50.4	8.9	52.1	9.1	51.9	8.2	54.0	6.6
Colorado	33.9	25.1	NR	NR	37.9	20.3	38.4	23.2	42.3	19.3
Connecticut	NR	NR	NR	NR	56	10	55	12	56	11
Florida	32.8	25.3	35.9	27.0	38.2	17.5	46.3	17.5	47.9	16.5
Georgia	NR	NR	NR	NR	NR	NR	36.1	23.3	37.2	23.7
Hawaii	30.5	24.6	NR	NR	42.4	17.9	33.5	21.7	NR	NR
Idaho	33.1	21.2	25.6	26.5	27.3	24.1	34.6	17.5	41.8	16.3
Kansas	30.5	22.2	37.8	19.5	38.9	21.1	38.4	18.1	45.3	18.4
Louisiana	29.0	24.2	32.5	21.5	35.2	20.6	31.1	20.8	30.1	21.2
Massachusetts	42.6	18.3	54.6	5.7	55.2	6.6	59.2	4.4	60.4	4.0
Missouri	NR	NR	32.4	22.4	34.1	20.2	35.2	19.3	37.8	17.2
Montana	36.7	19.7	26.9	23.3	34.7	22.5	29.3	24.9	31.0	25.7
Ohio	45.7	17.2	49.3	16.2	54	11	57	9	59.9	5.7
Pennsylvania	NR	NR	NR	NR	36.2	19.8	35.5	24.0	35.8	23.8
Rhode Island	49.2	11.2	51.6	11.7	55.7	11.9	51.2	15.9	47.8	16.0
South Carolina	NR	NR	31.1	23.0	31.5	22.6	33.4	21.5	32.4	21.5
South Dakota	39.4	19.9	41.9	19.6	38.7	18.2	44.0	16.9	44.9	15.5
Texas	NR	NR	NR	NR	37.6	22.0	42.6	18.8	44.2	16.4
Virginia	NR	NR	38.8	19.5	48.8	12.9	50.8	17.0	54.0	11.6
Wisconsin	39.6	18.7	49.7	12.8	53.1	7.7	57.7	6.3	62.3	5.4
Wyoming	36.8	20.1	33.2	21.9	37.2	18.3	38.4	18.2	41.9	16.5
National Average	37.3	20.6	39.5	18.6	41.5	17.8	42.7	17.3	44.7	16.38

Notes:
NR = Not reported
Number of states = 14 in 1969; 15 in 1970; 22 in 1971, 1972, and 1973.

It is important to remember, too, that these participation figures are not an index to the amount of Title I funds spent on students in various grade groups. Federal comparability requirements are meant to ensure that within a given district, all similar schools (e.g., all elementary schools, or all junior high schools) receive equal basic allotments of state money prior to the addition of categorical Title I funds. These guidelines do not, however, require that Title I funds be equally distributed either within or among types of schools: this decision remains at the discretion of the state and local educational agencies.

Some states, such as California, mandate a "baseline" Title I expenditure per pupil. Participating secondary projects can be funded at the baseline amount, however, while primary and preschool projects are funded at significantly higher levels without violating such laws. A few states do report per pupil expenditures of categorical funds by grade in their annual ESEA reports. In Connecticut, for example, preschool projects in 1970-71 spent approximately $604 per pupil, elementary school projects spent from $386 to $1,364, while high school projects averaged only $302 per student.

Unless we assume that compensatory education services for older children are intrinsically less expensive than similar services for young children, we must conclude that fewer services are provided for adolescents, even on a per pupil basis.

Grade Equivalent Gains

The first task in the analysis of program effectiveness was to discover whether indeed compensatory programs in intermediate grades had lower records of grade-equivalent gains than did programs in primary grades, and to establish any existing patterns of difference in g.e. gain according to grade.

Tables 2 through 4 display the results of this analysis using weighted state means. (See Appendix B for an explanation of the weighting procedures. In Appendix A, Tables A-2 through A-4 display the

Table 2

MEAN GRADE-EQUIVALENT ACHIEVEMENT RATES
IN COMPENSATORY READING PROGRAMS, BY GRADE,
WEIGHTED BY ELIGIBLE POPULATION

	1970-71					
	National Sample		Expanded Quality Sample		Quality Sample	
Grade	Rate	N*	Rate	N*	Rate	N*
1	0.9	11	0.8	6	0.8	6
2	0.9	17	0.9	7	0.9	7
3	0.9	22	0.9	7	0.9	7
- - -	- - - - - - - - - -		- - - - - - - - - -		- - - - - - - - -	
7	1.0	16	1.1	5	1.1	5
8	0.9	14	1.0	5	1.0	5
9	1.1	12	1.1	4	1.1	5

* Number of states reporting.

Table 3

MEAN GRADE-EQUIVALENT ACHIEVEMENT RATES
IN COMPENSATORY READING PROGRAMS, BY GRADE,
WEIGHTED BY ELIGIBLE POPULATION

	1971-72					
	National Sample		Expanded Quality Sample		Quality Sample	
Grade	Rate	N*	Rate	N*	Rate	N*
1	1.0	16	1.1	10	1.1	5
2	1.0	25	1.1	13	1.1	7
3	1.0	25	1.2	13	1.2	7
- - - -	- - - - - - - - - -		- - - - - - - - - -		- - - - - - - -	
7	1.2	23	1.3	14	1.3	7
8	1.1	23	1.3	14	1.3	7
9	1.2	17	1.5	10	1.6	5

*Number of states reporting.

Table 4

MEAN GRADE-EQUIVALENT ACHIEVEMENT RATES
IN COMPENSATORY READING PROGRAMS, BY GRADE,
WEIGHTED BY ELIGIBLE POPULATION

	1972-73					
	National Sample		Expanded Quality Sample		Quality Sample	
Grade	Rate	N*	Rate	N*	Rate	N*
1	1.0	18	1.0	14	1.0	5
2	1.1	27	1.1	18	1.1	7
3	1.0	28	1.1	19	1.2	7
- - -	- - - - - - - - - -		- - - - - - - - - -		- - - - - - - - -	
7	1.1	28	1.1	19	1.2	7
8	1.1	27	1.2	17	1.3	6
9	1.3	19	1.3	14	1.5	4

*Number of states reporting.

results obtained for this analysis using unweighted state means.) Three samples of increasing quality are used here. The first, National Sample, includes all states reporting gains by grade level in a given year. The second, Expanded Quality Sample, includes only those states reporting on a random or 50% testing sample. The third, Quality Sample, is limited to that portion of the previous sample that reported in all three years. (A more detailed discussion will be found in Appendix B.)

From these figures it is clear that intermediate programs do not achieve lower average g.e. gains than do primary programs.

In order to determine whether this pattern was produced by a few extremely high gain programs in the upper grades, a check was made of the 60 instances in which grades 7-9 could be compared with gains in grades 1-3 in the same states during the same years. Tables 5, 6, and 7 display this comparison. It is apparent that the phenomenon of intermediate programs achieving g.e. gains equal to or greater than those found in the primary grades is confirmed within states as well as across states. Thus it appears that the high gains of programs in the upper grades are a consistent trend rather than the artifact of a few unusually successful programs.*

Congress has consistently stressed the importance of achieving month-for-month gains in compensatory programs. We seriously question the general adequacy of this standard either as a goal or as a measurement of the educational value of compensatory programs. It is particularly questionable in the intermediate and secondary grades where demonstrated competence in skills and subject matter, and similar measures

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*As an informal check of frequency (and with the understanding that the procedure was limited by the intricacies of data aggregation) combination rates were produced by averaging across grade-groups in the same 60 cases. In 45 cases intermediate gains exceeded primary gains, in 4 cases they were equal, and in 11 cases primary gains exceeded intermediate gains. These comparisons are detailed in Tables A-5, A-6, A-7, B-7 of the Appendix.

Table 5

MEAN RATES OF GAIN IN COMPENSATORY READING PROGRAMS REPORTED BY INDIVIDUAL STATES, BY GRADE 1970-71

State ID No.	Grade Level					
	1	2	3	7	8	9
3	1.1	0.8	0.9	1.1	1.8	1.1
5	0.7	0.8	0.7	1.0	0.9	1.0
16	1.1	1.1	1.2	1.0	1.2	1.4
17	--	1.1	1.0	1.3	1.3	1.1
25	--	1.1	1.1	1.3	0.3	1.1
26	0.6	0.9	0.8	1.0	1.0	1.0
34	0.7	1.1	1.1	1.0	0.7	1.2
35	0.5	0.8	0.8	0.9	0.8	--
40	1.7	1.1	1.4	2.6	2.8	2.6
44	--	0.8	0.6	0.8	0.7	--
45	--	0.9	0.7	3.0	4.3	2.3
49	--	1.0	1.0	1.1	1.0	1.5
50	1.1	1.0	1.2	1.2	0.9	1.7

Table 6

MEAN RATES OF GAIN IN COMPENSATORY READING PROGRAMS, REPORTED BY INDIVIDUAL STATES, BY GRADE
1971-72

State ID No.	Grade Level					
	1	2	3	7	8	9
1	--	1.1	1.2	1.3	1.3	--
3	0.8	0.9	0.9	1.0	1.1	1.0
5	1.0	1.1	1.3	1.2	1.3	1.7
16	--	1.0	0.9	1.1	1.1	--
17	--	1.1	1.0	1.2	1.3	--
21	1.2	0.8	0.8	1.1	0.7	--
22	0.8	1.0	0.9	0.8	0.7	--
23	1.4	1.2	1.3	1.5	1.5	1.5
26	0.7	0.9	1.0	1.0	1.0	1.1
28	--	1.1	1.1	1.3	1.1	1.0
31	0.8	0.9	1.0	1.0	1.0	1.1
34	0.8	0.9	0.9	0.9	1.0	0.9
35	0.8	0.9	0.9	0.8	1.0	0.8
40	1.1	1.3	1.5	1.5	1.6	2.4
41	--	0.8	0.8	1.0	0.9	0.6
42	1.0	1.4	1.1	1.4	1.0	0.8
44	--	1.1	1.0	1.2	1.0	1.1
45	1.0	1.4	1.3	1.4	1.5	1.2
49	0.5	1.2	1.3	1.5	1.4	0.6
50	1.4	1.1	1.0	1.8	1.5	1.8
51	0.4	1.2	1.2	1.5	1.2	2.0

Table 7

MEAN RATES OF GAIN IN COMPENSATORY READING PROGRAMS REPORTED BY INDIVIDUAL STATES, BY GRADE
1972-73

State ID No.	Grade Level					
	1	2	3	7	8	9
1	--	1.1	1.1	1.4	1.3	--
3	1.1	0.9	1.0	1.0	1.0	1.0
5	1.0	1.1	1.1	1.1	1.3	1.6
10	0.9	0.9	0.9	0.9	0.8	0.6
11	--	0.9	0.6	0.7	0.7	--
12	0.8	0.9	0.9	1.0	0.9	0.9
13	1.0	1.2	1.5	1.3	1.5	1.5
16	--	0.9	1.0	1.2	1.1	--
17	--	1.3	1.3	1.2	1.5	--
18	1.3	1.2	1.2	1.1	1.3	1.3
22	1.0	1.2	1.0	1.5	1.8	--
23	1.3	1.3	1.2	1.3	1.3	1.5
26	0.6	1.1	1.3	1.3	1.1	1.3
28	0.7	1.1	1.1	1.2	1.1	1.1
35	0.5	1.0	1.2	1.0	1.1	1.1
39	--	0.8	1.1	1.2	1.1	1.2
40	0.6	1.4	1.5	1.7	2.0	1.9
41	--	0.8	1.0	0.8	1.0	0.5
42	0.9	1.0	0.9	0.9	0.9	0.8
44	--	1.0	0.7	1.0	0.8	1.2
45	1.2	1.3	1.2	1.3	1.7	1.6
46	1.8	1.1	1.2	1.0	0.7	--
47	--	0.9	1.0	1.0	1.1	--
49	1.0	1.6	1.1	1.1	1.0	--
50	1.4	1.4	1.5	1.5	1.4	1.7
51	0.8	1.1	1.1	1.7	1.1	1.6

of total outcome, would be far more to the point. Nevertheless, it is the case that gains at this rate are required if disadvantaged students are to attain and remain on an achievement path parallel to the national norm. Table 8 shows the number of states reporting at least month-per-month gains in compensatory reading programs by grade for each of three years. It is evident that programs in the intermediate grades meet or exceed this Congressional standard, even in states which cannot report average month-per-month gains in their overall Title I efforts.

Moving Students Toward the Norm

There are any number of ways to define program success. It is argued, for instance, that intermediate grade programs could not be said to be "as successful" as primary grade programs unless they were able to move students an equal proportion of the way toward national norms. Another way of stating this is to say that programs at different grade levels need to achieve equal percentile shifts in student placement.

It is true that the useful meaning of any differences in g.e. gains cannot be established without relating them to changes in the distribution of students along percentile scores. Figure 1 may help in visualizing this concept. (Also see Fennessey 73.) The "normal" student achieves a month's improvement in standardized reading scores each month of his school life. Thus when the student enters the 2nd grade, she/he will read at 2.0, at 4.0 upon entering the 4th grade, and so on. This student falls at the midpoint or 50th percentile of the distribution of all students (in the figure line A). A student at the 25th percentile follows a different achievement path. Typically she/he will read at the 1.7 level upon entering 2nd grade, 3.2 in the 4th grade, 4.7 in the 6th grade, and so on. Thus her/his achievement describes a line that rises more slowly, diverging more and more from the "norm" (line B). The standard definition of "disadvantaged" is a pupil who achieves at a rate of 0.7 of the norm, or about the 18th percentile (line C). Thus the gap between the disadvantaged student and the 50th percentile student will have two characteristics over time:

Table 8

STATES REPORTING MONTH-FOR-MONTH RATES OF READING ACHIEVEMENT OR HIGHER, BY YEAR
(Number of States)

Grade	1971--States Gaining*/Reporting†	1972--States Gaining*/Reporting†	1973--States Gaining*/Reporting†
1	7/11	8/16	9/18
2	9/17	17/25	17/27
3	13/22	15/25	22/28
4	15/20	19/26	19/27
5	13/21	19/24	21/27
6	11/19	20/24	20/27
7	13/16	19/23	22/28
8	8/14	20/23	21/27
9	11/12	11/17	14/19
10	6/8	11/14	16/19
11	7/8	10/14	14/17
12	6/6	8/13	11/15

*States gaining = number of states reporting month-for-month gains or better.

†States reporting = number of states reporting gain scores in that grade.

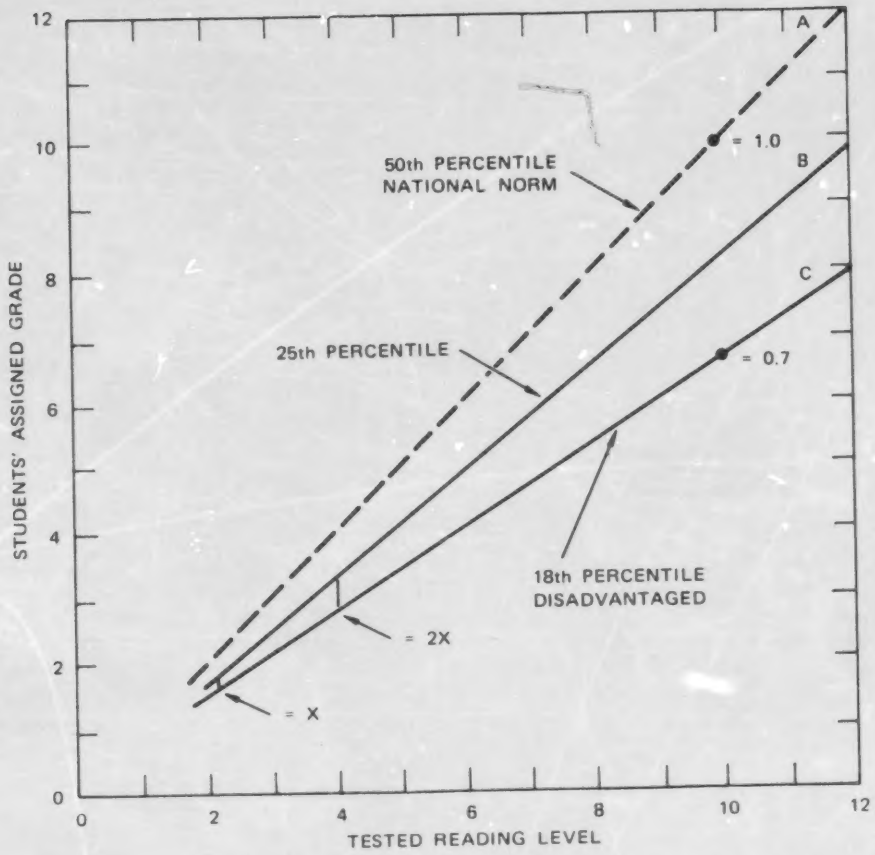

FIGURE 1 EXPECTED READING ACHIEVEMENT PATTERNS WITHOUT COMPENSATORY PROGRAMS

- The g.e. difference will increase steadily, being greater in the 8th grade than in the 2nd grade.
- The percentile difference will remain constant, that is, it will be the same in the 8th grade as it was in the 2nd grade.

From this perspective, the objective of compensatory programs is to move students from one percentile group to a higher one, thus reducing both the absolute and the relative differences among students. Thus, g.e. changes must be almost twice as great at grade 8 as at grade 2, for example, in order to move a student in each grade the same distance toward the norm. A preliminary check of Tables 2 through 4 suggest that while g.e. gains may be somewhat greater in intermediate programs than in primary programs, they are certainly not twice as great. However, since the issue under discussion now is not total gain but rather program effect, Tables 2 through 4 do not tell the whole story.

It is overstatement to attribute total g.e. or percentile change to the effects of any special program; students would clearly have made some gain during a year of regular schooling without any special program. The crux of the question is how much a special program adds to this expected gain. This must be calculated by subtracting expected g.e. gain from total g.e. gain at each grade level. If the remaining gain "attributable program effects" is approximately twice as large in the intermediate grades as in the primary grades, this suggests that programs have approximately equal effects at both levels.

To test this hypothesis, four separate samples of increasing quality were created from the original data base. The "National Pretest" sample includes all states which reported a pretest score, regardless of data quality. The "Twelve State" sample includes only states which reported pretests in at least two study years, regardless of data quality. The "Pretest Quality" sample uses only states reporting in all three years, and reporting pretests in at least two years, and using a random or 50% testing sample. The "Expanded Pretest Quality" sample includes in any year only those states reporting

pretests and meeting sample quality requirements. The difference between total gain and expected gain may be attributed to program effect. These program gains are shown in Tables 9 through 11, and in Appendix Tables A-9 through A-11.

According to this measure, the g.e. effects of compensatory education are different among grades. They tend to increase over grades, and are about twice as great at the intermediate level (grades 7 through 9) as they are at the primary level (grades 1 through 3). This is what would be expected if the programs were about equally effective. As the quality of the data increases, this comparison becomes more pronounced. These figures suggest that present programs are producing the g.e. gains required to move participating students in both grade groups approximately equal distances toward the national norms.

Tables 9 through 11 are also useful for pointing out several special aspects of present Title I operations. For example, calculations of expected gain must be extremely tenuous in grade 1. It is a common practice in some schools to "treat" all first grade pupils rather than only the disadvantaged population. This results in the peculiar phenomenon of having first grade compensatory education projects in which the mean and median pretest is above the national norm. For example, the mean pretest scores for 1st grades are high in the following states: Maine 1972, 1.2; Massachusetts 1972, 1.4; Missouri 1973, 1.1; North Dakota 1971, 1.5; Rhode Island 1972, 1.4.

Thus grade-equivalent gains in the early grades should be treated with great caution since reported gains may often be considerably inflated by this factor. It is impossible to separate the progress of students who have genuine academic disadvantages from those who do not. To be consistent, we calculated all expected program gains in the same manner. This resulted in the phenomenon of first grade students starting above the national norm and actually losing considerable ground during Title I programs, ending up the year noticeably behind national norms. This situation is less likely to occur at each higher grade since for practical reasons (the shortage of available funds) projects become more and more careful to select students with genuine and proven academic problems.

Table 9

WEIGHTED MEAN GRADE-EQUIVALENT GAINS IN READING SCORES ASCRIBED TO COMPENSATORY EDUCATION PROGRAM EFFECTS BY SUBSAMPLE 1970-71

Grade	National Pretest				12-State Sample			
	Expected Yearly Gain	Actual Gain	Gain Ascribed to Program*	N†	Expected Yearly Gain	Actual Gain	Gain Ascribed to Program*	N†
1	.95	.86	-.85	6	.96	.82	-.14	5
2	.77	1.01	.24	10	.73	.91	.18	8
3	.71	1.04	.34	12	.70	.91	.21	9
7	.65	1.05	.39	10	.65	.99	.34	7
8	.68	.84	.16	8	.69	.93	.24	6
9	.65	1.11	.46	8	.65	1.06	.41	6

Grade	Quality Pretest				Expanded Quality Pretest			
	Expected Yearly Gain	Actual Gain	Gain Ascribed to Program	N‡	Expected Yearly Gain	Actual Gain	Gain Ascribed to Program	N‡
1	.98	.72	-.26	2	.98	.77	-.21	2
2	.74	.84	.10	3	.74	.91	.17	3
3	.68	.77	.09	3	.68	.90	.22	3
7	.75	1.05	.30	2	.75	1.25	.50	2
8	.76	.98	.22	2	.76	1.29	.53	2
9	.71	1.05	.34	2	.71	1.25	.54	2

*Weighted by number of Title I eligible students in each state used.

†Number of states.

‡Number of programs.

Table 10

WEIGHTED MEAN GRADE-EQUIVALENT GAINS IN READING SCORES
ASCRIBED TO COMPENSATORY EDUCATION PROGRAM EFFECTS BY SUBSAMPLE
1971-72

Grade	National Pretest				12-State Sample			
	Expected Yearly Gain	Actual Gain	Gain Ascribed to Program*	N†	Expected Yearly Gain	Actual Gain	Gain Ascribed to Program	N†
1	.99	.90	-.09	9	.98	.92	-.07	7
2	.72	1.03	.31	15	.73	1.01	.28	11
3	.70	1.08	.38	15	.71	1.09	.38	11
7	.65	1.13	.49	13	.65	1.11	.46	11
8	.63	1.10	.47	13	.63	1.12	.49	11
9	.64	1.26	.62	9	.66	1.31	.65	7

Grade	Quality Pretest				Expanded Quality Pretest			
	Expected Yearly Gain	Actual Gain	Gain Ascribed to Program	N‡	Expected Yearly Gain	Actual Gain	Gain Ascribed to Program	N‡
1	1.01	.95	-.06	3	1.01	.98	-.03	6
2	.71	1.08	.37	4	.73	1.06	.33	8
3	.69	1.25	.56	4	.70	1.19	.49	8
7	.64	1.20	.56	4	.64	1.20	.56	8
8	.63	1.27	.64	4	.64	1.21	.57	8
9	.64	1.62	.98	3	.65	1.59	.94	5

*Weighted by number of Title I eligible students in each state used.

†Number of states.

‡Number of programs.

Table 11

WEIGHTED MEAN GRADE-EQUIVALENT GAINS IN READING SCORES
ASCRIBED TO COMPENSATORY EDUCATION PROGRAM EFFECTS BY SUBSAMPLE
1972-73

Grade	National Pretest				12-State Sample			
	Expected Yearly Gain	Actual Gain	Gain Ascribed to Program*	N†	Expected Yearly Gain	Actual Gain	Gain Ascribed to Program	N†
1	.90	.98	.08	8	.95	.93	-.02	7
2	.73	1.04	.32	13	.73	1.10	.37	10
3	.68	1.05	.37	13	.68	1.10	.42	10
7	.64	1.11	.48	13	.63	1.16	.53	10
8	.64	1.19	.55	12	.64	1.29	.65	9
9	.61	1.32	.71	8	.61	1.37	.76	6

Grade	Quality Pretest				Expanded Quality Pretest			
	Expected Yearly Gain	Actual Gain	Gain Ascribed to Program	N‡	Expected Yearly Gain	Actual Gain	Gain Ascribed to Program	N‡
1	1.02	.92	-.10	3	.95	.98	.03	6
2	.74	1.11	.37	4	.73	1.10	.37	8
3	.69	1.14	.45	4	.68	1.13	.45	8
7	.64	1.20	.56	4	.64	1.16	.52	8
8	.63	1.29	.66	4	.63	1.29	.66	7
9	.63	1.56	.93	3	.64	1.50	.86	6

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* Weighted by number of Title I eligible students in each state used.

† Number of states.

‡ Number of programs.

Additional Remarks

There is other vital information about the effectiveness of compensatory programs that our present evaluation cannot tell us. Our present data tell us nothing, for example, about how well students are learning to use the increasingly sophisticated and powerful cognitive abilities which they acquire as they grow up. It does not tell us how well adolescent students can solve tasks of logic and generalization, or how creatively they can recombine the bits of knowledge they have at their disposal. We do not know whether they are interested in or satisfied by their own learning experiences, or whether they are learning the personal and social skills that can ultimately allow them to assume better jobs and better lives than they would otherwise. All we really know is that they have acquired five or twenty or two hundred new vocabulary words each year, and this is minimal information indeed.

What we would really like to know is whether any programs result in a change in acquisition rate that is more than temporary, and whether such changes are more lasting when made at certain age levels. Until such time as a careful longitudinal study is done we will have no answer to this central issue in compensatory education. Particularly as we turn our attention toward the needs of intermediate and secondary students, we must face the task of developing more illuminating and pertinent evaluative measures. What emerges from this study, however, is that on the measures currently in use, compensatory programs for adolescents are as effective as the programs we have for younger students, and possibly more so.

Finally, some comment must be made on the standard discounts which are made of program success at the intermediate and secondary levels.

It is frequently argued that month-for-month gain is easier to attain at the 6th grade level than at the 3rd, precisely because the skills achievement gap is so large that it leaves much room for improvement. This is a little like saying that it is a great deal easier for someone who is three years behind to learn than it is for someone

who is only one year behind. Statistical analyses of gains at different levels abound. We have found no persuasive logic that "months of gain" by older students are less important or significant than an equal number of months of gain by younger students.

Nor can we disparage program gains at the secondary level as merely accumulated effects of earlier program exposure. Again, the question cannot be answered definitively until longitudinal studies are done. Increasingly the evidence, however, regarding over-the-summer losses and the noncumulation of gains in such states as California, suggest strongly that gains in any given year at any grade level represent the learning done in that time period only, and do not reflect previous exposure.

The evidence presented in this section shows clearly that compensatory education programs can be effective with early adolescence. Other data show with equal clarity that there are large numbers of adolescents who vitally need special assistance if they are to achieve basic skill levels and to function effectively as adults. The present concentration of compensatory funds on the early grades is neither eliminating nor meeting these needs. Early adolescents both need and can profit from compensatory programs; this should be a strong mandate to the educational community.

The more we are able to draw back from the organismic paradigm, the more this makes sense. Compensatory programs must deal with different subject matter and different skills at each grade; the learning of 2nd grade skills cannot be substituted for the learning of 7th grade subjects, and the student will be successful in each instance in proportion to the potentials and motivation she/he brings to the classroom, and to the quality of the attention she/he receives.

V THE SCHOOL CONTEXT OF COMPENSATORY EDUCATION

If we are to understand the full impact and potential of compensatory programs for adolescents, we must examine the institutional and social contexts in which such programs operate.

The Difference in Schools

The organization of elementary schools facilitates the introduction of compensatory programs in basic skills. Instruction in basic reading and arithmetic is the acknowledged center of the curriculum, a practice that has significant side effects. First, the centrality of reading in the curriculum is reflected in the centrality of reading teachers in the school's social and organizational structure. Second, it is not necessary to create "special time" for basic skills instruction by taking time away from other subjects.

Beyond this, all primary-grades students--though they may vary greatly in relative skill accomplishments--differ little in terms of the absolute level of their skills. Thus the same set of instructional materials can be used with few problems for much of the range of student abilities in any single class. Finally, and most important, elementary school teachers have themselves been trained in how to teach basic skills. Their professional preparation has dealt specifically with appropriate techniques, and has stressed ways to cope with disparate student abilities.

Together, these characteristics make it simpler to implement at least the basic designs of compensatory programs in elementary schools than in junior high schools. Schedules and curricula do not need to be altered substantially, since the special programs merely accentuate their existing forms. Similarly, it is not always necessary to bring "outsiders"--reading consultants or specialists--into the school's

social network. Instead the programs simply enrich the existing professional investments of the staff. In-service training time can be used principally for acquainting teachers with new materials, which at present are abundant.

The situation is far more complicated in intermediate and secondary schools. There, the curricula are built up from courses with special content, such as U.S. history, biology, geometry, and so on. This in turn means that the administrative and social structure of the professionals center around departments and department chairmen. Since basic skills courses such as reading are not included in the usual curriculum, no particular member of the staff has a vested interest in promoting them. One reason for this is that the professional training of secondary teachers has been confined almost exclusively to the development of the knowledge of the chosen content area. By comparison with elementary teachers, intermediate and secondary teachers receive fewer pedagogy courses and are under much less pressure to acquire the techniques of teaching basic skills. Finally, by the time students have reached the junior high grades, there is a much broader absolute range in their basic skills.

Secondary schools must take a different approach if they are to provide needed help for students with basic skill deficiencies. Now, specialists must be imported, who have interests different from (and often conflicting with) those of the resident school staff. This contrast has a tendency to generate staff resistance to the compensatory programs. Teachers may be irritated when expensive and potentially glamorous special programs circumvent the established structure. Added to this is the difficulty of rearranging the existing curriculum so as to provide time for special classes. Bits of time may have to be chipped away from certain classes, or selected slow students may have to be excused for short periods from their regular schedules. The potential for territorial disputes is high.

Even if specialists and time can be found, and the necessary instructional materials are available, there is still an obstacle to

making basic skills instruction produce gains in content courses. Unless materials are found that can be used to raise skill levels in the content courses, slower students are likely to remain at a substantial disadvantage in coping with the subjects that comprise the core of a secondary school curriculum. In such situations, the benefits of compensatory courses may be extremely difficult for either the students or the faculty to perceive.

Successful Programs

In the face of these problems, it is impressive that any compensatory programs for adolescents are ever successful. Nevertheless, a number of highly successful programs are now in operation, appearing to provide effective help to disadvantaged older students. We have attempted to examine a few such programs to determine whether they share any common programmatic characteristics that might explain their success. Our particular interest here was in programs that have demonstrated success for more than a single year, especially those that have survived changes in personnel.

In the face of California's reputation for concentration on preschool and primary programs, it is at first surprising to find a number of highly effective and enduring programs for disadvantaged older students in that state. Nevertheless, in 1973, California identified 15 projects, operating within 24 different junior high grade groups, which demonstrated "exemplary gains" ranging between 1.5 and 3.8 month-per-month grade equivalents. Many of these projects are part of a special program entitled AB 938 designed by the State legislature to develop highly cost-effective models of basic skills education for junior high students.

Most of the California programs have now been replicated in at least one other school, and appear to have survived the trials of interdistrict dissemination. Findings available to date indicate that grade-equivalent gains are as high in the replication schools as in the original projects, and in some cases higher. The average cost of these

demonstration projects is $285 per pupil for reading and $240 per pupil for math. These costs compare very favorably with the costs of elementary projects, and the average is well under the minimum per pupil Title I expenditure level of $325 to $340 per pupil mandated by State law. On the average these projects increased the prior yearly skills gain of their students by over 100%. These figures indicate that effective intermediate remedial programs are well within the financial means available to many state and local education agencies.

Similar projects can be found throughout the nation, although we know of no other state legislation aimed specifically at their development or dissemination. Projects such as the Phoenix (Arizona) Union High School Reading Program, the Systems I Program in Lincoln, Nebraska, the Blue Mountain High School Title I Project, in Vermont, and the Pontiac (Michigan) Alternative Education Project, along with isolated projects within Right-to-Read, also appear to be providing effective, stable services.

A detailed study of successful programs is yet to be made; however, preliminary observation suggests that they have several important characteristics in common:

(1) Successful programs tend to place heavy emphasis on the specific diagnosis of basic skills problems for each individual student. Because of the general nature of both cognitive skills and diagnostic instruments in the early grades, detailed evaluation of individual problems is not possible then. The practice of using detailed diagnosis appears to be successful in capitalizing on the special cognitive characteristics of the older student.

(2) Some of the programs rely on providing individualized instruction in heterogeneous ability groupings, rather than group instruction in finely defined homogeneous groups. This technique seems to have two consequences: (a) reducing interpersonal competition and deemphasizing

an individual student's failure with respect to his peers, and (b) capitalizing on the ability of older students to teach and learn from each other when approval is provided for this type of behavior.

(3) Great importance is attached to locating or creating materials that relate newly acquired reading and math skills to the content of other courses in the student's curriculum. Accompanying this is an intensive effort to involve regular teaching staff, through in-service training to acquaint such professionals with the problems involved, and give them a stake in the outcome.

(4) In some instances it has been possible to review and redirect the whole junior high curriculum so as to create a more central place for basic skills, and to legitimize the learning of them for all students, not just the slower.

We must stress again that these observations are based on only a cursory examination of successful programs. A thoughtfully designed, detailed study is highly recommended to determine common characteristics of successful programs and to verify the causal relationship of such factors to program effectiveness. We can conclude with confidence, however, that although the obstacles to running effective compensatory programs in junior and senior high schools are significant, there also appear to be workable options available, if and when such programs are given adequate financial and moral support from state and local personnel.

VI THE SOCIAL CONTEXT OF COMPENSATORY EDUCATION

Compensatory education tends to be treated as a phenomenon wholly confined to the school system. Although originally conceived as education that would "compensate" for the presumably inadequate environment of poor children, thus establishing a link between the school and the society, it soon became instead a program to "compensate" for the presumably inadequate expenditures of the schools poor children attend. This change obscured the important relationships between these programs and other social patterns. It is not necessary or useful to elaborate all of these relationships here, but it is important to look at how the timing of such programs is related to other social conditions and attitudes.

Female Work Roles

It should not be very surprising that the demand for early childhood education as a priority should coincide with a great increase of women's participation in the work force. The sooner children are placed in the formal educational system, the more time is made available for the parent traditionally charged with their care--the mother--to engage in paid work.

Until recently, options for child care were extremely limited. The wealthy could hire others to care for young children, but middle and lower income women who had to work in order to provide basic family income usually made use of older siblings or relatives, or sometimes left the children to fend for themselves. Social stigma attached to the mother who worked for her own satisfaction and left her children in nursery centers. The social status of the family and adult status of men have depended to a large degree on the ability of the male to support his wife and children in the home, with no need for their additional incomes.

Early childhood education has relieved this stigma by providing a socially acceptable "purpose" for child care. If nursery schools can now improve a child's "educational experiences," mental vigor, and life chances, what mother would be so selfish as to deny her child such an opportunity? The longstanding reverence for "education" has, in this instance, provided a way to ease a difficult societal transition in adult work roles.

Given these circumstances, it is not surprising that advocates of early childhood education find a supportive public. It is equally unsurprising that the findings of those who question the need or efficacy--or the "scientific" basis--of early childhood education are received with less than enthusiasm by a public whose economic and psychological interests are well served by such programs.

Even if increasing the emphasis on the compensatory education of adolescent children did not reduce the economic resources available to programs for younger children, it would tend to undermine certain of the present social justifications for the latter. This is both unfortunate and unnecessary. If out-of-the-home child care is required in order to enable women to move into the work force, we should confront this demand directly. In the past, a day care program that merely made it more convenient for demonstrably poor women to accept low-paid employment did not attract other kinds of women. Now the women's movement has gained sufficient confidence to base its demand for child care on the presumed benefits to the mothers themselves and to the society in general.

Education Professionals and the Teacher Surplus

In 1964 the nation's birth rate was slowing down after the postwar boom, but most observers predicted a stabilization at an average of just over two children per couple, and the schools had adjusted to the changes in student population. By 1974 the birth rate has fallen dramatically to somewhat under the zero growth rate. This unanticipated demographic shift has had far-reaching consequences for the public

school system, and for the education professions. The declining birth rate has resulted in empty elementary school classrooms all over the United States. This in turn poses an increasingly severe budgetary problem for most school districts, since funds are made available from the state on the basis of enrollment (average daily attendance).

At the center of this crisis is the dilemma posed by relatively inflexible staffing patterns in the schools. Many unions demand that certified teachers be granted tenure following their first full year of employment by a school district. Once such tenure is granted, most teachers become permanent financial responsibilities of the district. Thus most districts cannot meet the financial pressures of declining enrollments by reducing the professional staff directly, but instead must rely on the slow and unreliable practice of stopping all new hiring and waiting until resignations and retirements bring the staff to manageable proportions.

Meanwhile, school districts seek alternative uses for both expensive teachers and expensive facilities. One obvious move is to broaden the school's clientele into the preschool population. The preschool population is preferable to most other options because it requires practically no re-training of staff. The substantial differences in the training of elementary and secondary school teachers make it extremely difficult to shift surplus teachers into the intermediate or secondary grades. Another obvious way to use surplus elementary teachers is to reduce student/teacher ratios in the primary grades or to introduce special programs financed by state or federal categorical funds which can sop up excess teacher payroll without alienating local taxpayers. Thus teachers whose jobs are threatened form another powerful and highly vocal constituency for nonadolescent compensatory programs, paradoxically as the result of declining numbers of young children in our society.

The Research Community

The interests of the research community are also highly invested, at present, in early childhood studies. During the early 1960s, research into early childhood intelligence development had been heavily funded, and was beginning to show some tangible findings at about the time that compensatory education programs were first suggested at the federal level. With the passage of Head Start and Title I, large amounts of money became available for both applied and basic research into early childhood intelligence. Such money came through the federal government, the large private foundations such as Ford and Carnegie, and, in smaller amounts, from universities and from state and local educational agencies. Thus the professional reputations of many researchers are now tied to a continued interest and belief in early childhood as a critical period. This sizeable and influential constituency can be expected to continue to press for the support and recognition that comes with federal programmatic emphasis.

The research community is intrinsically more flexible, however, than the teaching profession, for two reasons. First, the skills of education researchers are presumed to be applicable to a broad range of subjects. Second, the research community is in many ways much more directly responsive to policy initiatives. Providing their work is funded, they are willing to investigate almost anything.

Concepts of Equal Educational Opportunity

"Equal educational opportunity" is defined differently for the primary and the secondary grades. Traditionally, equal educational opportunity has been measured in terms of school inputs--the levels of annual per pupil expenditures, access to instructional facilities and materials, and so on.

One of the central justifications for the passage of ESEA was that low income students usually attend schools with levels of effective per pupil expenditures lower than the national average. We may argue about whether this assertion can be statistically established, but the fact

remains that the assumption was important in passing the bill. ESEA was intended to help equalize available financial resources for these schools and these students.

However, another central concern of compensatory education is that such programs, through an adjustment of inputs, will result in more equalized educational outputs. Greater success in school for poor children is supposed to lead to a more equal competitive chance in the job market, and hence to life outcomes more nearly like those of the majority of Americans. This theme leads toward a second definition of equal educational opportunity, based on some output measures. This is a goal to which many in the educational community and in the broader society aspire, but it has proven very difficult to implement.

In the abstract, either definition could be applied to compensatory education at any age level. Educational inputs could, theoretically, be equalized at every level. Many feel that the best way to begin equalizing educational outputs is by equalizing achievement rates in the lower grades, assuming that this will lead automatically to more equal achievement in the upper grades.

In practice, however, a dichotomy develops. Input definitions are applied to primary grades and output definitions are applied to secondary grades. Secondary schools have far more complicated cost and input structures than do elementary schools, resulting from their commitment to offer a wide variety of language, science, mathematical, and vocational courses. Such courses use vastly different amounts of labor and capital, and are of differential value to various types of students. Thus no one knows quite how to determine when and whether inputs have in fact been equalized in secondary school.

By contrast, the far simpler and fairly standardized elementary school curriculum varies little either within or across schools. This makes the approach to equalization relatively simple. Thus, the weight of our commitment to an input measure of equal education opportunity, plus the difficulty of implementing an output measure without adequate research tools, have led us away from special expenditures during the adolescent years.

Output Measures and Job Selection

Closely related to the above is the point that when attention is focused on the secondary schools, discrepancies in output (in terms of either attainment or of achievement) become much more pronounced and obvious. An increased commitment to compensatory education for adolescents must deal directly with what might happen if certain equalities in school outputs were achieved.

It has been suggested, for example, that any substantial narrowing of the differential distribution of academic skills at the high school level (presumably by raising the disadvantaged) would raise employment criteria to ever higher levels. This has typically been the American pattern recently; jobs that 15 years ago required only a high school diploma now require a college diploma. If the trend continues, the job chances of currently disadvantaged youth would not be appreciably altered by the equalizing of high school achievement.

Another suggested consequence of equalizing outputs is based on the principle that employers make hiring decisions not only--or even mainly--on the basis of school achievement, but rather rely heavily on their judgments about candidates' behavior, attitudes, and dress. That is, they judge the degree to which an individual has internalized and displays the norms of the industrial society.

Parsons (1959), Dreeben (1962), and other sociologists of the functionalist perspective assert that the acquisition of these norms is closely enmeshed in the process of school achievement. Thus we might anticipate that a narrowed (and presumably raised) distribution of achievement would be matched by a similar homogeneity in the acceptance of adult norms. While this would make the task of distinguishing between applicants more difficult, the difficulty would presumably be balanced by the lowered risk to the employer, since most candidates could be presumed to bring approximately equal sets of both skills and attitudes to the job.

Even if more equalized educational outputs would improve the economic and social opportunities of many students, particularly those

who are currently in low income and low achievement categories, it would also inevitably result in restricting these opportunities for the high income, high ability students who are now at the top of the heap.

Spady has raised an interesting variation, however. He suggests (1972) that the methods at hand which are most effective at homogenizing students' achievement at relatively high levels (i.e., various forms of mastery learning) will almost necessarily have the secondary effect of altering the behavior and value norms currently supporting school achievement. He suggests that the norms of cooperation and particularism that are implicit in such mastery approaches may socialize students toward less acceptance of the competition upon which much of the industrial and business structure is based. The resulting disjunction between education and the economy is one with potentially serious consequences. This is a very long-term view, however, and such effects would probably occur with other societal trends toward less competition.

It would be farfetched to suggest that social, economic, and academic minds are in collusion to maintain the current system in high schools, which so clearly differentiates between the winners and the losers. On the other hand, it is only a statement of the obvious that the social, economic, and educational structures are at present highly congruent, and that they tend to be mutually reinforcing. Effective compensatory education programs for adolescents, with their implied rejection of this pattern, could have broad social consequences which themselves deserve evaluation.

VII CONCLUSIONS AND RECOMMENDATIONS

Disadvantaged adolescents need basic reading and math skills, better thinking skills, new ways of learning content matter, personal and social skills, and useful career orientations. They also need to acquire these skills in a coordinated, mutually reinforcing, and non-stigmatizing way. Until now, our strategy in compensatory education has done little or nothing to meet these needs and has been piecemeal in the extreme. We have concentrated principally on infants and primary grade children, leaving students over the age of 12 to fend for themselves, and too often to fail. When an effort is made to help them, it is too often sporadic--a few weeks of movies on careers, assignment to a vocational track, or a brief and fragmented attempt to teach reading skills by using methods developed for 7-year olds--and in general are far too simplistic to provide for the complex cognitive and personal needs of the adolescent. Our present strategy, if it can be called such, has failed to make major inroads on the educational problems of disadvantaged adolescents, and a new plan is urgently required.

The habit of ignoring the educational needs of adolescents has been accentuated by preoccupation with early childhood research and by our social stereotypes of adolescents. Very young children have been seen as eager, compliant, malleable; therefore we have sought to change their basic intelligence and learning styles to fit a middle class image. Adolescents are seen as rebellious, unpleasant, and unable to learn. We have therefore overlooked many of their personal and cognitive qualities that can assist in solving learning and adjustment problems. A new look at existing research suggests that for cognitive, psychological and social reasons, early adolescence may be an extremely

fruitful time for academic learning. It is the time when the child approaches full development of his intellectual capacity, and in addition becomes capable of making independent and reasoned decisions on the basis of his own needs and potentials. He can bring to his learning and his developmental tasks a great potential based on his increased cognitive sophistication, his new relationship to himself and his environment, and his growing concern for his own survival in the adult world.

The abilities of adolescents and preadolescents are clearly different from the abilities of young children; older children are suited to learning different things, and to learning in different ways. These potentials can be put to use in developing sound compensatory education programs.

General Strategy

The review of evidence from state ESEA Title I reports, presented earlier, does not support the assertion that students past the age of 10 are beyond some critical point in the development of their intellectual capacity and can no longer benefit from compensatory education. Neither does this study support the notion that programs during the early grades are more effective than programs during intermediate or secondary grades. On the contrary, it would appear that present programs at all grade levels are about equally effective on the measure used. It is also clear that the need for such compensatory programs does not stop after the 3rd, or 5th or 6th grade, but continues throughout the school career of a disadvantaged student.

The structure of junior and senior high schools makes organizing compensatory programs particularly difficult, a situation aggravated by the apathy or even hostility of many district and state level officials toward such efforts. Thus programs must often operate on "stolen" time, with inappropriate materials and inadequate staff, and under the constant threat of dissolution. They exist on marginal and tenuous budgets and in the shadow of the early childhood mystique. That

intermediate or secondary programs should have been successful--even occasionally--under these circumstances would have been surprising. That they have as good a record of success as programs in the primary grades is amazing.

On a national scale, the need for compensatory help for disadvantaged adolescents has yet to be combined with the personal and programmatic potential to provide this attention. Our study points to the fact that compensatory education is a continuing requirement for disadvantaged children, and that continuous or at least recurring participation in specially designed programs throughout all grades is essential if the educational outcomes of this target group are to be improved.

For this reason our first and most fundamental recommendation is that the most effective strategy at the federal level for achieving the range of objectives of compensatory education would be a coordinated series of interventions at successive age levels.

At the intermediate and secondary levels, such interventions should combine attention to specific cognitive skill development and to other academic, personal, and vocational skills.

We recommend that those individuals who are responsible for directing federal education policy rethink the present pattern of expenditures and create a more comprehensive and hence more effective strategy of age-appropriate education.

To support and guide the development and implementation of a new strategy, a new approach to research must also be created.

Research

During the past 15 years, federal sponsorship of research has been focused on issues of early childhood development and cognition. Outside the realm of direct government support, however, much has also been discovered about learning and motivation during the adolescent years. From the present bases of research and program experience, a sharply focused plan of additional research could be designed now that would pay high

dividends in usable knowledge in a relatively short period of time. Our second and strong recommendation is that the Education Division devote a major effort to investigating the issues underlying adolescent learning and compensatory education.

Studying Successful Programs

The research effort that we feel to be most pertinent is to locate and analyze those projects throughout the United States that have dealt successfully with the specific challenges of the adolescent and pre-adolescent years.

When compensatory education programs for young children were instituted on a large scale, we had no backlog of experience with operating projects from which to learn and the process of developing workable models has been a painful and expensive one. We are in a far more fortunate position now. There are already many successful, enduring, and cost-effective programs for adolescents from which we can learn immediately. Locating and studying them is a task that we feel deserves the highest priority.

In Section IV we suggested a few tentative observations regarding common characteristics of some successful programs. Additional successful programs should be identified and then a comprehensive analysis of cause-effect relationships made that would link specific psychological processes and learning outcomes to program characteristics. Special attention should be paid to analyzing techniques for the direct teaching of thinking skills, cognitive strategies and problem solving techniques, and methods for the wide adoption of these techniques in compensatory programs.

Goals and Measures

There is growing recognition that we have backed ourselves into a corner by our singleminded reliance on the standardized test as a measure of program and project evaluation. The inadequacy of standardized tests and the inadvisability of our dependence upon them is especially

pronounced when dealing with compensatory projects in the intermediate and secondary grades.

The central problem is that we have not defined what long-term goals mean operationally, nor have we developed any broadly valid measurements against which the progress of students and schools toward such goals can be evaluated.

A first step would be the definition of a range of mid-range goals that are both relevant to long-term goals and suitable to specific age levels. The definition of such mid-range goals, both in process and product, is well within the reach of our present research knowledge of teaching and learning, if they receive the political priority needed for development.

Many states have taken steps to define mid-range objectives in the specific area of determining minimum competences and content knowledge expected of high school graduates. Sometimes these efforts have met with enthusiastic public support; equally often the issues which are thus raised about the accountability of teachers and schools have aroused fierce opposition. Nevertheless, these efforts show that it is possible to think in detail about the academic, personal, and vocational skills that are the foundation for productive participation in adult life.

When relevant objectives have been clarified, we will be in a position to apply our sizable existing research technology to the prompt development of more varied and more sensible evaluation tools. Techniques such as criterion-referenced tests and fine-tuned classroom observations are available now, and in use in selected projects; others are easily within present technology if incentives are provided for their development.

The development of better measurement tools could in turn, provide the kind of data useful in making practical decisions about cost effectiveness, or about the suitability of a specific project to a comprehensive compensatory strategy.

The effort required to reconsider goals and measures must be undertaken jointly by policymakers and by the research community. For the Education Division this would require establishing a working partnership between USOE, ASE, and NIE focused on these topics.

Cost Effectiveness

This study has been able to address issues of cost effectiveness only tangentially. Cost information from projects in California indicate that the average cost of the highly successful junior high school programs is well within the range of average expenditures for compensatory projects at other grade levels. A careful cost-effectiveness study is needed to sharpen such observations for policymaking.

Such a study would examine a number of issues. For example, we would like to know more about the total cost of effective compensatory education at various grade levels. Variations in the structure, scheduling, and purpose of elementary, junior high, and senior high schools are certain to result in different cost structures for compensatory programs at these levels. Much more needs to be known, however, about these cost structures, and how they affect program implementation. A single standard of cost effectiveness is unlikely to be appropriate to the variety of structures and objectives needed for a comprehensive strategy for compensatory education that extends over all age levels. The development of sound measures and estimates of cost effectiveness would enable administrators at the federal, state, and local levels to choose the most effective tactics.

Longitudinal Studies

Policy analysis suffers from the lack of longitudinal studies that could shed light on the long-term consequences of compensatory interventions at various age levels. Some studies have been done on the retention of reading gains from early childhood programs, but most report that reading gains were not retained after leaving the special programs. Our preliminary investigations suggest that this phenomenon

also occurs when participation is stopped after the primary grades, but no studies have yet detailed the process. Most existing studies have been forced to rely on cross-sectional data rather than on the school and test records of specific students over time. Nor do we know of any thorough studies of the long-term effects of compensatory interventions during early adolescence and the secondary grades.

A retrospective study of program effects over time would now seem especially useful in the formation of a new federal strategy. If it is undertaken, we would stress the importance of examining a broad range of consequences--including the retention of specific subject matter, attitudes toward education and society, and the application of academic knowledge and life skills. Such a study should have two goals: to discover the range of consequences of interventions at various ages, and to relate these to a well defined set of policy objectives.

The need for longitudinal studies must not delay the development of a new strategy for compensatory education for three, five, or eight years while researchers compile volumes about a special experimental group. Sufficient records now exist at the state, district, and local level to allow us to determine the general outlines of what we need to know. Given the urgency of the present situation, an analysis that needed a brand new data base would inevitably come too late and do too little. However, a retrospective study that used existing records would be of considerable assistance in the policy tasks at hand, and would provide a necessary complement to the other research tasks outlined above.

Immediate Steps

Policy changes need not be postponed until research is completed: this delay would be reasonable only if children stopped failing in the meantime. Our third recommendation is that the Education Division begin to take steps to ease the transition into a more balanced strategy and to provide some immediate compensatory assistance to adolescents. The following four areas deserve prompt attention.

Bias

The organismic paradigm has distorted our thinking for a decade and has led to the neglect of adolescence accompanied by implicit and explicit federal bias. This bias seeps into regulations and guidelines, and into the conversations of officials. It is reflected in the attitudes and actions of officials at the state and local levels. We therefore recommend that the Education Division act to remove favoritism toward programs in the primary grades, and undertake a thorough search for and study of any instance of official bias according to student's age in regulations, guidelines, and publications for those programs designated to be for Elementary and Secondary students, particularly in ESEA Title I.

Dissemination

Program administrators at the state and local levels are often unaware of the many fine projects now in operation. We recommend that a two-step program be undertaken to publicize successful projects for adolescents and to "package" such projects for broad dissemination.

The Education Division has shown admirable caution in certifying projects as "exemplary," and the procedures developed for controlling this approval are commendable. Since only one or two projects at the intermediate or secondary level have yet been singled out for packaging, it will be some time before a range of "exemplary" programs is ready for dissemination. However, much can be done to bring projects of high potential to the attention of those who design Title I programs and those who allocate Title I funds without invoking the "exemplary" stamp. Such publications as American Education and other broad-based information vehicles of the Education Division are well suited for such an effort.

Demonstration Projects

The most influential tool at the disposal of the federal government is the demonstration grant. It is particularly well suited to

developing models that require special effort to integrate a new idea into many aspects of the school, as in the case of models for adolescent compensatory education where remedial work in basic skills is integrated into content areas. A demonstration project is also a way of fostering innovative experiments by providing added incentives to the entire school or district for their cooperation and support. Thus it would seem an obvious and potent tool for dealing with the present need to nurture good adolescent programs, and to encourage state and local officials to take what may appear to them to be substantial risks in supporting compensatory efforts for the adolescent years.

We feel that on the basis of what is already known, a small but highly publicized demonstration-grant program for compensatory education at the junior and senior high levels would be worthwhile, particularly if it is preceded by an effort to inform officials of the potentials and need for such programs. We recommend that the Education Division undertake the sponsorship of such a demonstration grant program at the earliest opportunity.

Supportive Operations

In general, projects of compensatory education for adolescents face sizable problems in finding the materials and staff required to do the job well. If emphasizing the potential and need for adolescent compensatory assistance is to be fruitful, steps must be taken to ensure the adequate supply of staff and materials. Productive, innovative teaching materials must be developed making special use of the cognitive, personal, and social characteristics of adolescents, local program designers must be made aware of and easily able to obtain such materials, and teachers must learn how to use them.

Special attention should be given to the training of teachers in the specific skills and orientations of doing remedial work with adolescents. Techniques developed for infants and young children are not usually applicable to working with youth. Special provisions also need to be made for the in-service retraining of secondary teachers in

a variety of content areas so that greater coordination can occur between students' new and changing basic skills and the rest of their school experience.

The climate created by the attitudes and interest of a school's entire professional staff is crucial to the success or failure of special projects. A new effort in compensatory education for adolescents can be given a great boost toward success if the full USOE experience can be turned to easing administrative barriers to implementation, and to creating a supportive climate for new projects.

If junior and senior high schools are to be vital educational institutions, they must change, and they must do so now. An excellent place to begin that change is in our treatment of and regard for the potentials of disadvantaged youth.

Appendix A

SUPPORTING DATA

These tables back up tables in the main text that have the same numbers.

Table A-2

UNWEIGHTED MEAN GRADE-EQUIVALENT ACHIEVEMENT RATES
IN COMPENSATORY READING PROGRAMS, BY GRADE
1970-71

Grade Level	National Sample		Expanded Quality Sample		Quality Sample	
	Rate	Number	Rate	Number	Rate	Number
1	1.0	11	1.0	6	1.0	6
2	0.9	17	1.0	7	1.0	7
3	1.0	22	1.0	7	1.0	7
7	1.3	16	1.4	5	1.4	5
8	1.3	14	1.4	5	1.4	5
9	1.4	12	1.5	4	1.5	5

Table A-3

UNWEIGHTED MEAN GRADE-EQUIVALENT ACHIEVEMENT RATES
IN COMPENSATORY READING PROGRAMS, BY GRADE
1971-72

Grade Level	National Sample		Expanded Quality Sample		Quality Sample	
	Rate	Number	Rate	Number	Rate	Number
1	0.9	16	1.0	10	1.1	5
2	1.1	25	1.1	13	1.1	7
3	1.1	25	1.1	13	1.2	7
7	1.2	23	1.3	14	1.3	7
8	1.1	23	1.2	14	1.3	7
9	1.2	17	1.4	10	1.7	5

Table A-4

UNWEIGHTED MEAN GRADE-EQUIVALENT ACHIEVEMENT RATES
IN COMPENSATORY READINC PROGRAMS, BY GRADE
1972-73

Grade Level	National Sample		Expanded Quality Sample		Quality Sample	
	Rate	Number	Rate	Number	Rate	Number
1	1.0	18	.9	14	1.0	5
2	1.1	27	1.1	18	1.2	7
3	1.1	28	1.1	19	1.2	7
7	1.2	28	1.2	19	1.4	7
8	1.2	27	1.2	17	1.4	6
9	1.2	19	1.2	14	1.6	4

Table A-5

MEAN RATES OF GAIN IN COMPENSATORY READING PROGRAMS REPORTED BY INDIVIDUAL STATES, COMBINED BY GRADE-GROUP

1970-71

State No.	Grade Group 1-3	Grade Group 7-9	Comparison of Rates
3	.93	1.33	+
5	.7	.97	+
16	1.13	1.2	+
17	1.05	1.23	+
25	1.1	.9	-
26	.77	1.0	+
34	.97	.97	=
35	.7	.85	+
40	1.4	2.67	+
44	.7	.75	+
45	.8	3.2	+
49	1.0	1.2	+
50	1.1	1.27	+
		# +	10
		# -	2
		# =	1
		Total	13

+Combined gain rates of grades 7-9 higher than that reported in grades 1-3.

-Combined gain rates of grades 7-9 lower than that reported in grades 1-3.

=Combined gain rates of grades 7-9 equal to that reported for grades 1-3.

Table A-6

MEAN RATES OF GAIN IN COMPENSATORY READING PROGRAMS REPORTED BY INDIVIDUAL STATES, COMBINED BY GRADE-GROUP

1971-72

State No.	Grade Group		Comparison of Rates
	1-3	7-9	
1	1.15	1.3	+
3	.87	1.03	+
5	1.13	1.4	+
16	.95	1.1	+
17	1.05	1.25	+
21	.93	.9	-
22	.9	.75	-
23	1.3	1.5	+
26	.87	1.03	+
28	1.1	1.13	+
31	.9	1.03	+
34	.87	.93	+
35	.87	.87	=
40	1.3	1.83	+
41	.8	.83	+
42	1.17	1.07	-
44	1.05	1.1	+
45	1.23	1.37	+
49	1.0	1.17	+
50	1.17	1.7	+
51	.93	1.57	+
		# +	35
		# -	9
		# =	3
		Total	47

+Combined gain rates of grades 7-9 higher than that reported in grades 1-3.

-Combined gain rates of grades 7-9 lower than that reported in grades 1-3.

=Combined gain rates of grades 7-9 equal to that reported for grades 1-3.

Table A-7

MEAN RATES OF GAIN IN COMPENSATORY READING PROGRAMS REPORTED BY INDIVIDUAL STATES, COMBINED BY GRADE-GROUP

1972-73

State No.	Grade Group		Comparison of Rates
	1-3	7-9	
1	1.1	1.35	+
3	1.0	1.0	=
5	1.07	1.33	+
	--	--	
10	.9	.77	-
11	.75	.7	-
12	.87	.93	+
13	1.23	1.43	+
16	.95	1.15	+
17	1.3	1.35	+
18	1.23	1.23	=
22	1.07	1.65	+
23	1.23	1.37	+
26	1.0	1.23	+
28	.97	1.13	+
35	.9	1.07	+
39	.95	1.17	+
40	1.17	1.87	+
41	.9	.77	-
42	.93	.87	-
44	.85	1.0	+
45	1.23	1.53	+
46	1.37	.85	-
47	.95	1.05	+
49	1.23	1.05	-
50	1.43	1.53	+
51	1.0	1.47	+

+Combined gain rates of grades 7-9 higher than that reported in grades 1-3.

-Combined gain rates of grades 7-9 lower than that reported in grades 1-3.

=Combined gain rates of grades 7-9 equal to that reported for grades 1-3.

Table A-8

SUMMARY OF COMPARISON OF
GAIN RATES IN PRIMARY AND INTERMEDIATE GRADES
1970-1973

Status of Gain Rates	N
7-9 greater than 1-3	44
7-9 less than 1-3	12
7-9 equal to 1-3	4
Total	60

Table A-9

UNWEIGHTED MEAN GRADE-EQUIVALENT GAIN IN READING SCORES
ASCRIBED TO COMPENSATORY EDUCATION PROGRAM EFFECTS BY SAMPLE SIZE
1970-71

	National Pre-Test				12-State Sample			
Grade	Expected Yearly Gain	Actual Gain	Gain Ascribed to Program	N	Expected Yearly Gain	Actual Gain	Gain Ascribed to Program	N
1	1.12	.98	-.13	6	1.18	.99	-.19	5
2	.80	.98	.18	10	.76	.94	.18	8
3	.74	1.09	.35	12	.71	1.00	.29	9
7	.69	1.22	.55	10	.67	1.18	.51	7
8	.68	1.21	.54	8	.68	1.20	.52	6
9	.66	1.28	.61	8	.65	1.29	.64	6

	Quality Pretest				Expanded Quality Pretest			
Grade	Expected Yearly Gain	Actual Gain	Gain Ascribed to Program	N	Expected Yearly Gain	Actual Gain	Gain Ascribed to Program	N
1	1.15	1.00	-.15	2	1.15	1.15	0	2
2	.73	.93	.20	3	.73	.97	.24	3
3	.68	.95	.27	3	.68	1.03	.35	3
7	.71	1.53	.82	3	.71	1.80	1.09	2
8	.71	1.57	.86	3	.71	1.90	1.19	2
9	.72	1.53	.81	3	.72	1.80	1.08	2

Table A-10

UNWEIGHTED MEAN GRADE-EQUIVALENT GAIN IN READING SCORES
ASCRIBED TO COMPENSATORY EDUCATION PROGRAM EFFECTS BY SAMPLE SIZE

1971-72

	National Pre-Test				12-State Sample			
Grade	Expected Yearly Gain	Actual Gain	Gain Ascribed to Program	N	Expected Yearly Gain	Actual Gain	Gain Ascribed to Program	N
1	1.13	.81	-.32	9	1.14	.81	-.33	7
2	.74	1.05	.31	15	.73	1.03	.30	11
3	.72	1.05	.34	15	.72	1.07	.35	11
7	.67	1.20	.53	13	.66	1.15	.49	11
8	.66	1.11	.45	13	.65	1.12	.47	11
9	.65	1.24	.59	9	.64	1.26	.62	7

	Quality Pretest				Expanded Quality Pretest			
Grade	Expected Yearly Gain	Actual Gain	Gain Ascribed to Program	N	Expected Yearly Gain	Actual Gain	Gain Ascribed to Program	N
1	1.13	.93	-.20	3	1.12	.90	-.22	6
2	.70	1.10	.40	4	.77	1.11	.34	8
3	.68	1.25	.57	4	.73	1.14	.41	8
7	.64	1.25	.61	4	.68	1.28	.60	8
8	.64	1.30	.66	4	.69	1.18	.49	8
9	.66	1.73	1.07	3	.70	1.60	.90	5

Table A-11

UNWEIGHTED MEAN GRADE-EQUIVALENT GAIN IN READING SCORES
ASCRIBED TO COMPENSATORY EDUCATION PROGRAM EFFECTS BY SAMPLE SIZE

1972-73

	National Pre-Test				12 State Sample			
Grade	Expected Yearly Gain	Actual Gain	Gain Ascribed to Program	N	Expected Yearly Gain	Actual Gain	Gain Ascribed to Program	N
1	.95	.85	-.10	8	1.00	.79	-.21	7
2	.74	1.09	.36	13	.75	1.15	.40	10
3	.70	1.09	.40	13	.70	1.15	.45	10
7	.66	1.19	.53	13	.66	1.25	.59	10
8	.67	1.23	.56	12	.68	1.32	.64	9
9	.61	1.31	.70	8	.60	1.33	.73	6

	Quality Pretest				Expanded Quality Pretest			
Grade	Expected Yearly Gain	Actual Gain	Gain Ascribed to Program	N	Expected Yearly Gain	Actual Gain	Gain Ascribed to Program	N
1	1.10	.73	-.37	3	1.07	.80	-.27	6
2	.75	1.18	.43	4	.76	1.11	.35	8
3	.68	1.25	.57	4	.71	1.18	.47	8
7	.65	1.38	.73	4	.66	1.28	.62	8
8	.63	1.43	.80	4	.66	1.31	.65	7
9	.64	1.60	.96	3	.64	1.47	.83	6

Appendix B

DESCRIPTION OF DATA BASE AND PROCEDURES

Introduction

This appendix is primarily devoted to the data in the 147 state Title I reports analyzed for this study. The appendix begins with a general discussion of what a state Title I report is and what kind of information it contains, followed by a discussion of which data we could include in our study and which data we could not use. This is followed by a more detailed display of the actual data used in this report. The last sections of the appendix deal with other possible ways we could have looked at the state data, including a reweighting of the sample means, and a description of various types of new samples.

For readers who are unfamiliar with state Title I reports, we will describe them briefly and discuss their reporting procedures at greater length than we did in Section IV. The achievement data for individual states will be presented in a subsequent report.

Description of Title I Reports

The federal Office of Education has required in the past that each state submit an annual report of the state's Title I activities. The state education agencies (SEAs), in turn, request this information from their local education agencies (LEAs), usually a local school district. Just as our study is based on the highly variable state reports, those state reports are based in turn on highly variable information submitted by the LEAs. In a few states fairly uniform evaluation procedures have been requested of the LEAs by the state agencies, but in many states no uniformity is attempted. Once they have collected all the data, the SEAs sift and compile the information into their annual evaluation reports. A typical state report includes sections on:

(1) Participation and financial information and activities of the SEA

(2) An assessment of student needs and the local objectives to emerge from this assessment

(3) Evaluation methods and program effect on educational achievement

(4) Dissemination activities

(5) Coordination with other federal programs

(6) Parent involvement and advisory councils

(7) In-service training.

Summer school information and nonpublic school participation, expenditures, and achievement data are sometimes integrated into the above sections and sometimes reported separately.

The section on evaluation of achievement usually included some (not necessarily all) of the following information: which standardized tests were used, what methods were used to calculate and report gains, methods of evaluation other than standardized tests, pretest-posttest intervals, problems encountered both by the SEA and LEAs in the evaluation; and, occasionally, prior average yearly gains, IQ scores of Title I students, and factors affecting achievement. Most evaluation sections also included achievement data from standardized tests.

The need for evaluation of educational achievement has grown faster than the number of educators trained in evaluation techniques, and the Title I reports reflect this gap. Some state evaluations have been directed and compiled by highly skilled evaluators, others reflect a more limited knowledge of evaluation, and still others are put together by small, overworked SEA staffs who barely have the time and resources to fulfill the minimum requirements of the legislation. Skill in evaluation techniques is not the only limiting factor. Many states would like to conduct other kinds of evaluations, but find themselves with too little money and too few staff to carry them out. Although SEA and

LEA reporting procedures improved over the period covered by our study, substantial improvement is still needed.

Section IV briefly touches on the kinds of data presented in the state reports. Our study divided the reports into two categories: (1) those that include standardized achievement test data in grade equivalents by grade level,* and (2) states that report data in other than grade equivalents or report little or no test data. Data from Category 2 reports were not used.

State Reports Used in This Study

The data that we did use can again be put in two groups: (1) reports that present achievement gains in average monthly gains and (2) reports that present what we termed "program gains." Average monthly gains are derived by subtracting the pretest from the posttest and dividing this difference by the length of the test interval. For example, if a third-grade class average pretest was 2.3 and average posttest was 3.1 and the interval between tests was 7 months, the average monthly gain would be 1.1 (3.1 - 2.3 = 0.8 ÷ 7 = 1.1). Program gains are derived by simply subtracting the pretest from the posttest; in the example above the program gain would be 0.8. To make the data comparable for the state-to-state aggregations used in this study, we converted program gains (where given) to average monthly gains. (In some cases the test interval was given in the state report; in others we talked with the SEA Title I evaluators to determine the interval.)

In addition to the above distinction, the states reported gains in the following ways:

(1) The state aggregated test data across districts and across tests, and presented a statewide mean gain by grade level.

*Two states reported gains only for their most effective projects; these data were omitted from all analyses.

(2) The state aggregated across districts and presented mean gains by grade level by test.

(3) The state aggregated across tests and presented gains by grade level and by district.

(4) The state aggregated data in any of the above three ways (usually the first) and presented data by ranges of gain (gain reported in number or percentage of students achieving varying degrees of gains. A typical selection of ranges of gain would be: 0-0.7, 0.71-1.00, 1.01-1.50, 1.51 and above).

A number of states did not present statewide means. In several states, we aggregated the data across school districts. In other states, we had to aggregate across different tests; while in some states we had to aggregate over both district and type of test. Ten state reports presented their results in ranges of rate of gain, e.g., a state would report how many students had a rate of gain of less than 0.7 month in reading achievement for each month in the program, how many students had a rate between 0.71 and 1.00, between 1.01 and 1.50, and over 1.51. We were able to calculate a statewide mean by the following procedure: estimate the mean of each range by calculating the range's midpoint. (The midpoint, 0.85, of the range 0.71 to 1.00 was used as the estimate of the range's mean. 0.35 was used as the midpoint--the mean--of the range of scores below 0.7 and 1.75 was used as the midpoint--the mean--of the range above 1.5. Zero was always used as the endpoint of the lowest range and 2.0* was used as the endpoint of the highest range.) The estimated mean was then multiplied by the percentage or number of students in that range. An average of these weighted means was then calculated. This average became the statewide mean at each grade level used for that state. Several states reported means for a grade as well as the number or percentage of students in each range. In these states

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*Wisconsin was an exception to this rule since they actually reported ranges much more extensively than other states.

we were able to verify the procedure by calculating a statewide mean from the ranges and comparing this mean to the reported statewide mean. These comparisons showed little or no difference between the mean reported by the state and the mean calculated from the ranges.

The reporting method for each of the 33 states which were used in this study can be seen in Table B-1.

State Reports Not Used in This Study

State reports that did not report the results of standardized achievement tests in grade equivalents were not used in this study. A number of these omitted reports were well done--numbers of children tested were high, they were competently written, and their authors were aware of evaluation problems and methods. We regretted being unable to use their data.

Some of these omitted reports contained no data from standardized tests. These reports often presented "systematic measures," meaning students' achievement was usually reported in terms of varying levels of success--e.g., "very successful," "somewhat successful," "not successful." The measures used to determine these levels of success varied, but often included teacher-made tests, teacher observations, and criterion-referenced tests, and were sometimes used in combination with standardized test data (although the data were not presented) to determine success levels.

Other omitted state reports contained primarily narrative information or case studies, usually on a county-by-county basis. Some of them had a sprinkling of data but the Ns reported were extremely small--usually by classroom. Table B-2 lists these kinds of information, none of it used in this study.

Some of the omitted reports did contain data on the results of standardized testing. However, these data were not usable because either they were not reported in grade equivalents (e.g., results were reported in stanines only), they were aggregated across several grades or the data were only from the state's most successful projects. These states are also listed in Table B-2.

Table B-1

REPORTING METHODS OF STATE REPORTS INCLUDED IN THIS STUDY

State	Average Monthly Gains				Program Gains			
	Statewide Mean	Ranges of Gain	By Test	By District	Statewide Mean	Ranges of Gain	By Test	By District
Alabama					71	73[1]	72,73[1]	
Arizona		72,73					71	
California	72[1], 73[1]	71,72,73						
Delaware							72[3]	
Florida		73						
Hawaii						73[2]		73
Idaho							71	
Iowa					72,73		71	
Kansas	72[1], 73[1]	72,73	72				71	
Kentucky					73			
Maine	72[1]	72						
Maryland		73[1]	71[2]	71,72,73				
Massachusetts	71[1], 72[1], 73[1]	71,72,73	72,73					
Michigan[4]	71,72,73							
Minnesota		72,73						
Mississippi								71
Missouri						73[1]	71,72,73	
Nebraska					71[1], 72[1], 73[1]	72,73	71,72,73	
New Jersey		72						
No. Carolina							71,72	
No. Dakota		72			73[1]	73	71	
Pennsylvania	71,72,73							
Rhode Island	71,72,73							
So. Carolina			72,73				71[3]	
So. Dakota	73						72	
Texas[5]		72[2], 73[2]		71,72,73				
Utah	73[1]			72,73	71			
Virginia			73					
W. Virginia								71,72,73
Wisconsin	71	72[1], 73	72					
Wyoming					72[1]		71,72,73	

Notes:

1. Data for one year were presented in two (or more) ways; (e.g., Alabama 73 is both by categories of gain and by test).
2. Data were presented in a combination of two categories; (e.g., Hawaii 73 presented data in a format where mean gains for districts were reported by categories of gain).
3. Data were from one district and one test.
4. Michigan reported by "type of component" (component meaning an instruction method), e.g., small group instruction, tutorial; we aggregated across types of components.
5. In all three years, Texas grouped data by size of district (i.e., over 35,000 average daily attendance, and under 35,000 ADA). In 1973 Texas also reported by method of instruction (combined with ranges of gain and district size).

Table B-2

KINDS OF INFORMATION INCLUDED IN STATE REPORTS NOT USED IN THIS STUDY

State	Standardized Testing			Little or No Standardized Testing	
	Other[1] than GEs	Grades Combined	Most Successful Projects	Systematic[2] Measures	Narrative or Case Studies (by County)
Alaska					71,72,73
Arkansas		73	71,72		
Colorado	71,72,73				
Connecticut		71,72,73			
Delaware	71,73				
Florida	71,72				
Georgia		71,72	72,73	73	
Hawaii	72	71			
Illinois		71	71	72,73	
Indiana[3]				72	71[4]
Kentucky[5]					71[4]
Louisiana[6]	72,73				
Maine[7]				73	
Minnesota[8]					
Mississippi	72			73	73
Montana					71,72,73
Nevada	71	71		72,73	
New Hampshire	71	71,73			72[4]
New Jersey[3]				71	
New Mexico		71,72,73			
New York[3]		72	71		
No. Carolina					73[4]
Ohio		71,72,73			
Oklahoma	71			72	73
Oregon	72,73	71,72,73		71,72,73	
So. Dakota	71	71			
Tennessee[9]					
Vermont					71[4]
Virginia		71,72		71,72	
Washington			71,73	72	

Notes:

1. Percentile categories (usually the shift from one decile, quartile, etc. to another), stanines, raw scores, significant differences between pre- and post-test, and the like.
2. Systematic measures: usually reported in terms of percentage or numbers of students achieving varying levels of success; e.g., "very successful," "somewhat successful," and usually measured by teacher-made tests, teacher observation, criterion referenced tests, and sometimes combined with standardized tests.
3. 1973 report not available.
4. Primarily narrative and by county with some grade equivalent data on extremely small Ns sprinkled throughout.
5. 1972 report not available.
6. Louisiana in 1971 presents GE data by grade level in categories of gain; however, one category spanned two grade points (1.1-2.9) so we did not include these data.
7. Maine, in their 1971 report, presents GE data by grade level. However, the pretest was administered in September 1969 and post-test in May 1971, thus it covers two school years, 1969-70 and 1970-71. We did not include it for this reason.
8. Minnesota in 1971 reported in GEs by grade level in categories of gain; however, the categories were too broad (less than 0, 0-1.0, 1.0 and above) to include in this study.
9. The policy in Tennessee is to return the child to the regular classroom (from the Title I class) as soon as his reading skills will allow it, so a majority of the students do not spend a full year in Title I. Pre- and post-testing then is usually not on the same child; thus we have not included their achievement data.

Sample Sizes

State reporting procedures are improving in one final area as well: the percentage of Title I reading participants for whom scores are reported. We have already noted that an increasing number of state reports include reading achievement results in grade equivalents by grade level. Of these states, the percentage reporting on over 50% of the children participating in reading programs has increased yearly from 1971 to 1973. The following tabulation illustrates this trend:

	School Year		
	1971	1972	1973
States reporting reading achievement results by grade level	22	27	28
States reporting on over 50% of reading participants	7	14	19
Percentage	32	52	68

Thus, in school year 1972-73, over two-thirds of all states reporting achievement results by grade level reported results for more than 50% of their reading population. Of course, the 50% criterion is only an arbitrary standard, and by itself does not ensure that the scores reported by a state will be representative of that state's Title I reading population. Nevertheless, data for large (nonrandom) samples are generally more reliable than data for small (nonrandom) samples; in this context, we consider the 50% criterion to be a useful benchmark against which the state reports can be measured.

When we consider all Title I reports, including those with achievement data averaged over grades, this improvement is equally apparent. From 1971 to 1973, 24 states increased the sample size (percentage of participants) for whom scores were reported, four states reported on either a random sample or on all their children in all three years, and only six states decreased the size of their sample during this period. Of this last group of six states, in one case the decline was attributed

to installation of a new data-processing system; in another case, even with the decline, the 1973 report included data for 52% of the Title I reading population.

We stated earlier that the general quality of the State Title I reports was not high. Despite this overall assessment, the trend in state reporting procedures is an encouraging one; dramatic improvements have been made in the last three years, and we are now close to the point where we can speak with confidence about the effectiveness of Title I reading programs.

Sample Weightings

The analyses are based on the sample means from individual State Title I reports. These sample means may be considered either as being obtained from a national school population, or as being obtained from a population consisting of 50 state school populations. This report has treated the state sample means as if they were obtained from a stratified sample, where each state represented a unique stratum. Our rationale for this decision was based on the results of the Friedman analysis of variance of ranks. However, it can be argued that the ESEA Title I program is a national program, and that our data should be considered as samples from a national school population.

If repeated samples, without replacement, are drawn from a single population, the population mean is estimated by an unweighted average of the sample data, i.e., by a sample mean. When we consider the means in the State Title I reports as being means of repeated samples without replacement taken from a single population, then they should be weighted according to their sample size. (When more than one sample is drawn, without replacement, from a single population, the sample mean may be calculated by taking a weighted average of the sample means, basing the weighting upon the samples' sizes.)

If samples are drawn from each stratrum of a stratified population, the population mean is estimated by a weighted average of the means, where each sample mean is weighted by the population of the stratum

from which the sample was drawn. When we consider the means in the State Title I reports as being means of a stratified population, then these means should be weighted on the basis of their state populations.

The results of the two possible weightings of the state sample means, by year, are shown in Table B-3. In 18 of the 36 comparisons the results are identical, and in 16 of the comparisons the results differ by only 0.1. Thus, only in two of the comparisons do the results of the weighting differ by more than 0.1, and in each of these cases, the sample means are based on a very small number of states.

Other Samples

The quality of the data in the State Title I reports is not high. Other ways of looking at the data might give different results or might show different trends. We therefore decided that the data should be examined in as many ways as possible. One alternative approach to the data was to form additional samples. The national sample reported in Tables 2 through 4 (and A-2 through A-4) used only data from states that reported reading achievement gains by grade level. This sample represented a reasonable compromise between size and quality. Obviously it would be possible to construct larger samples by using lower quality data, or smaller samples by using higher quality data.

The next sample reported in Tables 2 through 4 (and A-2 through A-4) includes only those states that reported data from a representative random sample, or data from at least 50% of their Title I participants. The number of states meeting these criteria was seven states in 1971, fourteen states in 1972, and nineteen states in 1973.

The final sample reported in Tables 2 through 4 (and A-2 through A-4) includes only states that met these same criteria in each of the three years covered by this report. There were seven such states.

Tables 5 through 7 (and A-5 through A-7) detail the national sample described at the beginning of this section.

Table B-3

COMPARISON OF WEIGHTINGS OF STATES' AVERAGE MONTHLY GAINS

	Grade											
	1971											
	1	2	3	4	5	6	7	8	9	10	11	12
Wt x Sample	0.8	0.9	0.8	0.9	0.8	0.8	1.1	1.0	1.1	1.0	1.2	1.5
Wt x State Population	0.9	0.9	0.9	1.0	0.9	0.9	1.0	1.0	1.2	1.1	1.4	2.0
	1972											
Wt x Sample	1.0	1.0	1.1	1.0	1.1	1.0	1.1	1.1	1.3	1.3	1.3	1.3
Wt x State Population	1.0	1.0	1.1	1.1	1.0	1.1	1.2	1.1	1.3	1.4	1.4	1.5
	1973											
Wt x Sample	1.0	1.1	1.1	1.0	1.1	1.1	1.1	1.2	1.3	1.2	1.3	1.3
Wt x State Population	1.0	1.1	1.0	1.0	1.0	1.1	1.1	1.2	1.3	1.3	1.3	1.2

Other data samples were created for later portions of the analysis in Section IV, and are used in Tables 9 through 11 (and A-9 through A-11). The first sample is referred to as the National Pretest. It includes only those states reporting both program gain and pretest by grade in any given year. Thus the sample size varied from year to year.

The next sample used in Tables 9 through 11 (and A-9 through A-11) includes only those states that administered and reported pretests in at least two of the three years under study. There were twelve such states.

The third sample comprises states that reported gains in all three study years, reported pretests in at least two of these three years, and used a random or 50% testing sample in each of the three years.

The final sample used in Tables 9 through 11 (and A-9 through A-11) is again a "variable" sample, indicating that the number of states to be included varies from year to year. States included in this sample were those reporting a pretest and using a random or 50% testing sample in the stated reporting year.

This proliferation of samples may be confusing at first, but we believe that the procedure of creating samples of increasing quality has allowed us to cross check our results in some sensible way. Each of the samples is constructed to meet particular statistical criteria appropriate for the particular section of analysis in which it is used.

The results of the six small samples are essentially the same as the results of the two larger samples. A confidence band with a width of 0.2 month, centered about the results of the National Sample, includes 120 out of the 144 results obtained from the small sample analyses. Thus, 120 of the 144 results differ from the results of our National Sample by no more than 0.1 month. Of the 24 results that do differ by more than 0.1, 22 of the results are based on our smallest samples (either six or seven states).

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